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ARMY GROUND GROUP

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FINAL REPORT

PERIODIC CRACK

ATOMIC BOMB TESTS, LINE 5, APPENDIX

VIII

27 January 1946 to 27 August 1946

VOLUME FIVE

OF

SEVEN VOLUMES

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Submitted By:

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J. D. FREDERICK,
Colonel, Infantry

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JOINT TASK FORCE ONE

ARMY GROUND GROUP
(TASK GROUP 1.4)

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TASK FORCE ONE

ARMY GROUND GROUP
(TASK GROUP 1.4)

TASK UNIT 1.4.4 (CHEMICAL)

FINAL REPORT
OF
ATOMIC BOMB TESTS

27 January 1946 to 27 August 1946

APPENDIX VIII
TO
ARMY GROUND GROUP REPORT

Submitted By:

H. C. ADAMS
Capt. CWS
CTU 1.4.4

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JOINT TASK FORCE ONE

TASK GROUP 1.4
(ARMY GROUND GROUP)

TASK UNIT 1.4.4
(CHEMICAL)

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JOINT TASK FORCE ONE
TASK GROUP 1.4
TASK UNIT 1.4.4

FINAL REPORT

I. INTRODUCTION

A. Object of Test

1. The object of the test was to expose a selected cross-section of Chemical Warfare Service equipment and fillings to the effects of an atomic bomb in an effort to determine: (a) the effects of heat, blast, and radiations on packaging, chemical composition and functioning, and (b) if any changes, in design and chemical composition of Chemical Warfare items, are necessary in order to insure their effective use in and after exposure to the detonation of atomic bombs.

B. Conditions of Test

1. Several conferences were held at the Office of the Chief, Chemical Warfare Service, with representatives of the various sections to compile a cross-sectional list of Chemical Warfare items to be exposed. Items which overlapped into other technical services, or items which were not typical of the CWS fields of endeavor were omitted. The number and weight of test items was kept at a minimum to facilitate handling. (List of Equipment - see Section IV - Description of Materials and Test Conditions).

2. Displays of both packaged and un-packaged items were planned. In this manner both the weather packaging and individual item could be exposed to the bomb blast. Further, to secure exposure in a graded manner, target ships were selected starting at the 1000 yard ring and terminating at a ship 3200 yards away from the expected center of burst. Six (6) identical test sets were displayed by the Chemical Warfare Unit on the six (6) target ships assigned by the Director of Ship Material. These ships and distances from the USS NEVADA were:

YOG-83 - 1000 yds	LCT-874 - 2000 yds
LCT-818 - 1200 yds	LST-661 - 2300 yds
LST-52 - 1500 yds	LST-220 - 3200 yds

3. All test items, whether packaged or individually exposed, were securely fastened to the ships assigned by metal strapping. In most cases pallets or padeyes were welded to the decks of the ships in order to provide suitable strapping facilities. Cloth and clothing were securely fastened by doubling an end back over

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a padeye, or similar fixture, and wiring. Examples of the methods of securing test items can be seen in Figures 1, 2, and 3. Special display racks for exposing the gas shells were welded to the decks of the six (6) target ships and the shells were secured in place in the racks by strapping. An example of this type of securing can be seen in Figure 4.

4. The Chemical Warfare Unit did not take active participation in Test BAKER. This report covers Test ABLE participation only. The decision of the non-display in Test BAKER was made when it was known that the second test was to be an underwater burst. It was felt that the effects of an underwater burst would be such as not to warrant the exposure of Chemical Warfare items in Test BAKER. This decision was concurred in by the Office of the Chief, Chemical Warfare Service.

II. CONCLUSIONS

A. It is concluded that:

1. Chemical Warfare test items displayed in normal weather packaging and boxing withstood the effects of the atomic bomb. (Section V - A.1 and B.1)
2. Dark colored containers were susceptible to the intense heat. Light colored containers, excepting rough wood surfaces, in the same area suffered no damage. (Section V - B.1)
3. Thin plicoflms could not withstand the heat at distances of 2300 yards or less from the blast. (Section V - B.1)
4. Plastics, as used in the containers of CWS Medical Kits, were susceptible to blistering and charring at distances of 1500 yards from the blast. (Section V - B.1)
5. One layer of flashproof cloth did not provide protection from the flash heat. Double and triple layers gave protection as close as 1000 yards. (Section V - B.1)
6. Coarse fabrics, impregnated or un-impregnated, were susceptible to ignition from the momentary intense heat. (Section V - B.2)
7. There has been no major functional or chemical breakdown of any Chemical Warfare test item directly traceable to the effects of the atomic bomb to date. (Section V - B)
8. Test items that were shielded from the blast were undamaged by the effects of the bomb detonation. (Section V - B.4)

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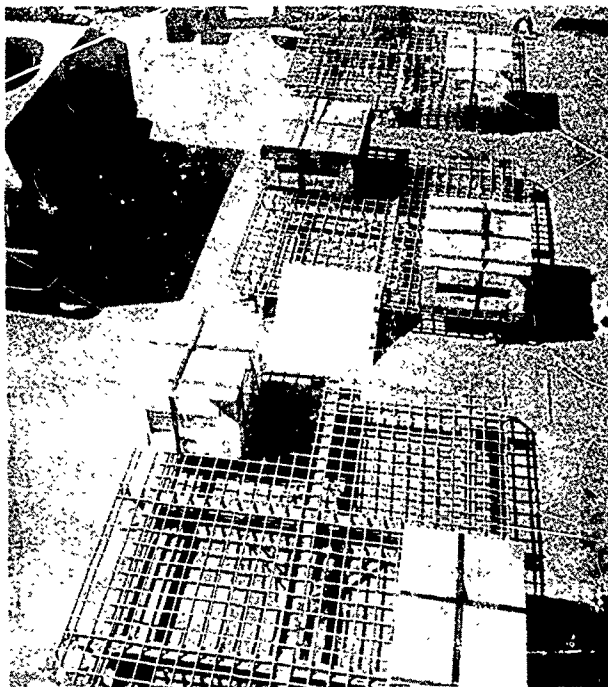


Figure 1. - Pallet Method of Strapping Test Items

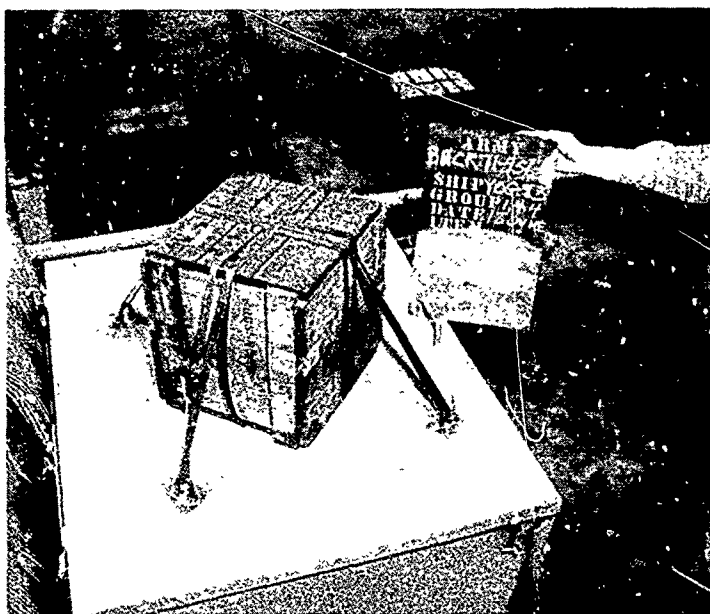


Figure 2. - Padeye Method of Strapping Test Items

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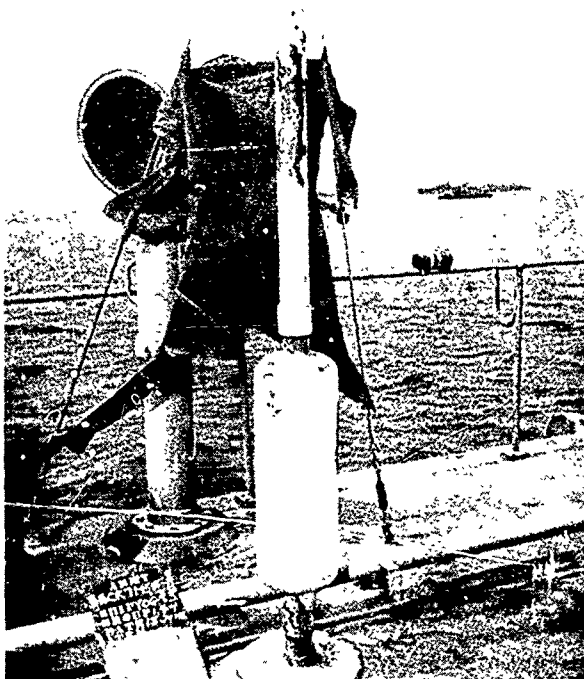


Figure 3. - Method of Securing Coveralls

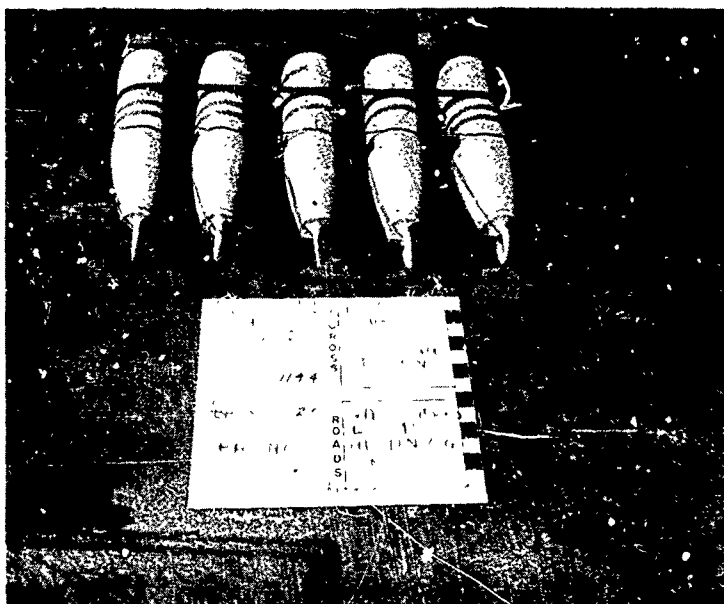


Figure 4. - Special Rack for the Gas Shell Display

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III. RECOMMENDATIONS

A. It is recommended that:

1. Chemical Warfare Service weather packaging be treated with a heat resistant substance in order to prevent scorching and charring of the outside surfaces of the packaging. In this way the loss of the outside identity, including the stenciling, will be minimized. The heat resistant treatment will also serve as an added factor for protection of the contents and in the control of fires.
2. Where possible, consistent with the requirements of the situation, heavy wood and light colored paints should be used in preference to rough splintered wood and dark colored paints to minimize outside scorching and surface charring.
3. A heavy rubber or canvas carrier should be designed for the headwound gas mask in order to protect it from the melting that was evident. The pliofilm carrier now used cannot be considered sufficient to protect the pliofilm mask.
4. The plastic containers used for certain medical kits should be replaced by heavy canvas containers using as an example the M-9 Detector Kit. As an alternative the plastic containers could be replaced by metal containers. Both the canvas and metal containers exposed withstood the effects of the atomic bomb, whereas the plastic kits suffered severe damage from the heat.
5. Flashproof cloth should be developed that will give protection from the flash heat of the atomic bomb inasmuch as the present cloth did not give protection. It is further recommended that tarpaulins and covers be treated with flashproofing to give protection to dumps, installations, and equipment.
6. A stronger closer woven fabric be used for impregnated clothing with development directed toward the use of heat resistant substances in the process of impregnation.
7. Effective use be made of all types of shielding and defilade in the location of CWS dumps, supply points, and in the tactical employment of Chemical Warfare Units.

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8. It is finally recommended that the Chemical Warfare Service not participate in Test CHARLIE, and further, that no special Army atomic bomb test take place until new protective methods, and redesigned materials and equipment, resulting from Test ABLE, have been planned and are ready to be tested. It will then be advisable to hold a land test, inasmuch as a water test such as Test BAKER, presented unnatural conditions and allowed only limited and controlled exposure of test items.

IV. DESCRIPTION OF MATERIALS AND TEST CONDITIONS

A. Test Items (By Master Item Number)

Item #1 - Agent, Decontaminating, M4

- a. Lot: DuPont Lot - TM 7, Lot - 2 Aug 25 34
- b. One container each exposed on the six (6) CWS target ships. Three (3) containers used as control samples.

Item #2 - Bleaching Material (Grade 3)

- a. Lot: Lot numbers illegible on each drum
- b. One drum each was exposed on the six (6) CWS target ships. Three drums were used as control samples.

Item #3 - Bomb, 4lb. Chemical Type, M1, BW

- a. Lot: Special non-toxic filling. Not from any lot of biological agents.
- b. Two bombs each were displayed on the six (6) CWS target ships. An additional two bombs each were displayed on the USS NEVADA, USS INDEPENDENCE, USS SALT LAKE CITY, and the USS FALLON. All bombs were delivered to the USS BURLINSON for study and report with the exception of four control samples and the two bombs on LST 220 which were shipped as per Appendix C.

Item #3A - Bomb, 100 lb., M47A2, BW

- a. Lot: Special non-toxic filling. Not from any lot of biological agents.
- b. One bomb each was displayed on the six (6) target ships. An additional one bomb each was

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displayed on the USS NEVADA, USS INDEPENDENCE, USS SALT LAKE CITY, and the USS FALLON. All bombs were delivered to the USS BURLINSON for study and report with the exception of two control samples and the one bomb displayed on LST 220. These were shipped to the mainland. (See Appendix C)

Item #4 -- Cloth, Flashproof, Protective

- a. Lot: Stock SE 712EAJ (Antimony oxide vinylite process)
- b. A piece approximately 6' x 3' was displayed on each of the six CWS target ships. It was folded in such a manner to present a triple layer to the blast.

Item #5 - Crayon, Vesicant Detector

- a. Lot: Unknown (Only broken lots available)
- b. One package each was displayed on the six CWS target ships. Six additional packages were used as control samples.

Item #6 - Cylinder, Ignition, PFT, M1

- a. Lot : NY5574-247
- b. This item was displayed both in its shipping box and in its individual package on the six CWS target ships. Three additional boxes were used as control samples.

Item #7 - Grenade, Hand, Smoke, WP

- a. Lot: 13960
- b. Displayed as Item #6 (b. above)

Item #8 - Grenade, Incendiary, AN-M14

- a. Lot: HA 318-17
- b. Displayed as Item #6 (b. above)

Item #9 - Grenade, Smoke, M18, Red

- a. Lot: 216-37
- b. Displayed as Item #6 (b. above)

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Item #10 -- Grenade, Smoke, M18, Yellow

- a. Lot: 304-15
- b. Displayed as Item #6 (b. above)

Item #11 -- Grenade, Smoke, M18, Green

- a. Lot: 218-38
- b. Displayed as Item #6 (b. above)

Item #12 -- Grenade, Smoke, M18, Violet

- a. Lot: 173-49
- b. Displayed as Item #6 (b. above)

Item #13 -- Kit, Chemical Agent Detector

- a. Lot: C-CWS 312-3, C-CWS 312-6, C-CWS 312-7, C-CWS 312-7X
- b. Kits from various lots were tested. The kits were exposed both in their shipping boxes and individually as if ready for use in the field. Six (6) additional boxes were used as control samples.

Item #14 -- Kit, First Aid, Gas Casualty

- a. Lot: Unknown -- Shipped per Appendix C.
- b. This kit was displayed individually unencumbered by any packaging on each of the six (6) CWS target ships. Six (6) kits were used as control samples.

Item #15 -- Kit, Food Testing, Screening

- a. Lot: Unknown -- Shipped per Appendix C
- b. Displayed as Item #14 (b. above)

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Item #16 - Kit, Ointment, Protective

- a. Lot: Unknown
- b. This item was displayed both boxed in its overseas package and individually without packaging on the six (6) CWS target ships. Three (3) boxes were used as control samples.

Item #17 - Kit, Poisoned Water, Treatment and Analysis

- a. Lot: Unknown - Shipped per Appendix C
- b. Displayed as Item #14 (b. above)

Item #18 - Kit, Treatment, Gas Casualty

- a. Lot: Unknown - Shipped per Appendix C
- b. Displayed as Item #14 (b. above) except only five (5) kits were used as control samples.

Item #19 - Kit, Water Testing, Screening

- a. Lot: Unknown - Shipped per Appendix C
- b. Displayed as Item #14 (b. above)

Item #20 - Mask, Gas, Headwound, M7-11-9

- a. Lot: Cannister numbers:

M11 FT 13-5-3 D45 JZ 16Z 235 grams
M11 FT 13-5-3 D45 JZ6PZ 16Z 227.5 grams
M11 FT 13-5-3 C43 HD 3Z6PZ 63 31 230 grams
M11 FT 13-5-3 C45 HD 3Z6PZ 28 30 232.5 grams
M11 FT 13-5-3 C45 HD 3Z6PZ 28 31 232.5 grams
M11 FT 13-5-3 C45 HD 3Z6PZ 46 31 232.5 grams
- b. This mask was displayed both in overseas packaging and individually exposed in its carrier on the six (6) CWS target ships. Six (6) boxes were retained as control samples.

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Item #21 - Mask, Gas, Service, M3-10A1-6

a. Lot: Cannisters by number:
M10A1 Lot JJ 12-4-2 81-19 BD 3V5 3-44 560 grams
M10A1 Lot JJ 12-4-2 BD 3V5 3-44 822 563 grams
M10A1 Lot JJ 12-4-2 BD 3V5 3-44 566 grams
M10A1 9-4-8 SC HH 325 517.5 grams
M10A1 8-4-2 SC HH 325 522 grams
M10A1 8-4-2 SC HH 325 532.5 grams

b. This mask was displayed both in overseas packaging and individually exposed in its canvas carrier, on the six (6) CWS target ships. Two (2) boxes were used as control samples.

Item #22 - Mask, Gas, service (Butyl) MIT

a. Lot: Cannister numbers:
M11 FT 28-5-2 HD 3Z6PZ 190-5 247.5 grams
M11 FT 28-5-2 HD 3Z6PZ 190-14 247.5 grams
M11 FT 28-5-2 HD 3Z6PZ 190-36 245 grams
M11 FT 28-5-2 HD 3Z6PZ 190-39 247.5 grams
M11 BS 543 8-17 FTS 223 196C 3R6PZ 252.5 grams

b. This gas mask was displayed both in overseas packaging and individually in its carrier on the six (6) CWS target ships. Five (5) boxes were used as reserve and control samples.

Item #23 - Paint, Liquid Vesecant Detector, M5

a. Lot: Unknown

b. This item was displayed in its small tin can, one on each of the six (6) CWS target ships. Six (6) cans were used for weathering experiments and control samples.

Item #24 - Pot, Smoke, Floating, M4A2

a. Lot: M-14-44 210A4Z
M-14-44 210A-2032

b. This test item was displayed in its individual overseas packaging on each of the six (6) CWS target ships. Three (3) pots were used as control samples.

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Item #25 - RH 195

- a. Lot: Unknown
- b. This material was exposed in individual unpainted tin cans on the six (6) CWS target ships. Six (6) cans were used for weathering and control samples.

Item #26 - Shell, Smoke, WP, 4.2 Inch CM

- a. Lot: 142-79 and 142-100
- b. Two each of these shells were exposed in the regular two-shell box on each of the six (6) CWS target ships. Three (3) boxes (six shells) were used as control samples.

Item #27 - Shell, Smoke, FS, 4.2 Inch CM

- a. Lot: 3931-1
- b. Displayed as Item #26 (b. above)

Item #28 - Bomb, Cluster, Incendiary, M12

- a. Lot: M69 Bombs, Lot NY 5460-67
- b. This bomb was displayed in its original container on the six (6) CWS target ships. Three (3) bombs were used as control samples.

Item #29 - Bomb, Cluster, Incendiary, M6

- a. Lot: M52A2 Bombs, Lot PBA 4001
- b. Displayed as Item #28 (b. above)

Item #30 - Napalm

- a. Lot: 21333, 21338, 21351, 21371
- b. This item was displayed in its olive drab painted tin container on the six (6) CWS target ships. Six (6) cans were used as control samples.

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Item #31 - CC2

- a. Lot: Unknown
- b. This item was displayed in individual unpainted tin cans on the six (6) CWS target ships. Six (6) cans were used for waethering and control samples.

Item #32 - Igniter, E3R1

- a. Lot: Unknown
- b. Displayed in its individual, tar cardboard, weather packaging on the six (6) CWS target ships. Six (6) additional packages were used for control samples.

Item #33 - Shell, Gas, 105mm, M60, HD

- a. Lot: Unknown
- b. This shell was displayed unboxed and completely exposed in a special rack on each of the six (6) target ships. Three (3) shells each were used as control samples.

Item #34 - Shell, Gas, 105mm, M60, HN1

- a. Lot: Unknown
- b. Displayed as Item #33 (b. above)

Item #35 - Shell, Gas, 105mm, M60, CG

- a. Lot: EA 99 3-46
- b. Displayed as Item #33 (b. above)

Item #36 - Shell, Gas, 105mm, M60, CK

- a. Lot: EA 99 3-46
- b. Displayed as Item #33 (b. above)

Item #37 - Shell, Gas, 105mm, M60, GA

- a. Lot: Unknown
- b. Displayed as Item #33 (b. above)

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Special Item (Item 4a) - Impregnated Coveralls

- a. Lot: Unknown
- b. Displayed on each of the six (6) CWS target ships. Extra suits made it possible to display two suits on each of the six (6) CWS target ships, plus using some suits as control samples.

B. EXPOSURE AND SECURING

1. The thirty-nine (39) separate test items listed in paragraph A, above, were exposed on the six (6) CWS target ships which were at the following distances from the actual burst of the atomic bomb:

YOG-83 - 1000 yds LST-661 - 2300 yds
LST-52 - 1500 yds LCT-818 - 1500 yds
LST-220 - 3300 yds LCT-874 - 2500 yds

The only exceptions were Item 3 and Item 3A (BW bombs) which were displayed on four additional target ships closer to the actual detonation. These target ships were: USS NEVADA (BB-36), USS INDEPENDENCE (CVL-22), USS SALT LAKE CITY (CA-25) and the USS FALLON (APA-81).

2. The CWS test items were displayed on the target ships in positions that would produce no shielding. However, due to the location in which the bomb exploded some shielding was evident. It will be fully discussed in Section V of this report. The actual layouts of CWS test displays on the target ships can be found in Appendix D of this report.

3. In order to prevent loss of items overboard as a result of the blast wave, all test items were securely fastened to the target ships. This securing was done in various manners. In most cases padeyes were welded to the ships in the appropriate places. In a few instances it was more expeditious to use metal pallets. These were welded to the target ships where required. When these securing devices were ready, test items were placed in the allotted space and strapped to the pallets or padeyes. (See Figure 1 and Figure 2). Small test items; for example, grenades, masks, etc., were wired in appropriate places on railings and what not. (See Figure 3 and Figure 5). This method of securing proved adequate to withstand the atomic blast.

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Figure 5. - Example of Wiring Down Small Test Items

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V. ANALYSIS OF TEST RESULTS

A. Introduction

1. Visual inspection and laboratory tests have been completed on all CWS test items. In summing up the effects of the atomic bomb on the test items it has been determined that heat was the major cause of damage. Blast had little effect and then only displaced items slightly. In only one instance were any fastenings broken. (See Figure 6). This 100 lb. bomb (Item #3A) was blown from the catwalk of the YOG 83 to the main deck, but suffered no other damage. There has been no indication of any effect of radiation on any of the test items to date. Functioning tests of munitions will be run again on 1 October 1946 at the 42nd Chemical Laboratory Company, Schofield Barracks, to determine if radiation had any effect over long periods. Items #3 and #3A are not included. (See Section VI A). The five medical items were analyzed at the Medical Division, CW Center, Edgewood Arsenal Maryland.

B. Effects of the Bomb

1. The intense heat produced by the atomic bomb caused only visible damage. It caused no chemical change nor did it alter the functioning of chemical munitions. Dark painted boxes and boxes made from thin, rough, splintered wood were susceptible to charring and scorching from the intense heat. (Figure 7). Light colored containers did not appear to be affected whatsoever. Plastics were blistered and charred (Figure 8), plastic film was melted (Figure 9), and cloth was burned (Figure 10). The heat did not set off any CWS munition, however. The effect of heat on test displays diminished as their distance from the burst increased. At 3300 yards, on LST 220, there was no visible effect of heat on any test item. Sufficient heat had been present there, however, to ignite a hawser and a fire hose. The effect of heat on the CWS test items, even though very intense, was normal and expected.

2. The effect of the blast of the atomic bomb was less noticeable than the effect of heat. About 10 % of the CWS test items were displaced by the blast, and then only slightly. In only one instance were any fastenings broken. The blast caused the 100 lb. BW bomb mentioned above to break loose. (See Section V - A.1 and Figure 6). Several light weight metal cans were caved in by the blast but no contents were lost. (See Figures 11 and 12). Cloth samples and impregnated coveralls stretched out for display on the nearer ships had major portions blown away by the blast. What remained was scorched and charred by the heat. (Figures 13 and 14). The effect of the blast at 1000 yards can be seen on the YOG 83 (Figure 15). It was of great intensity, but because the items presented such a small surface to the blast, the damage from the blast on the items was

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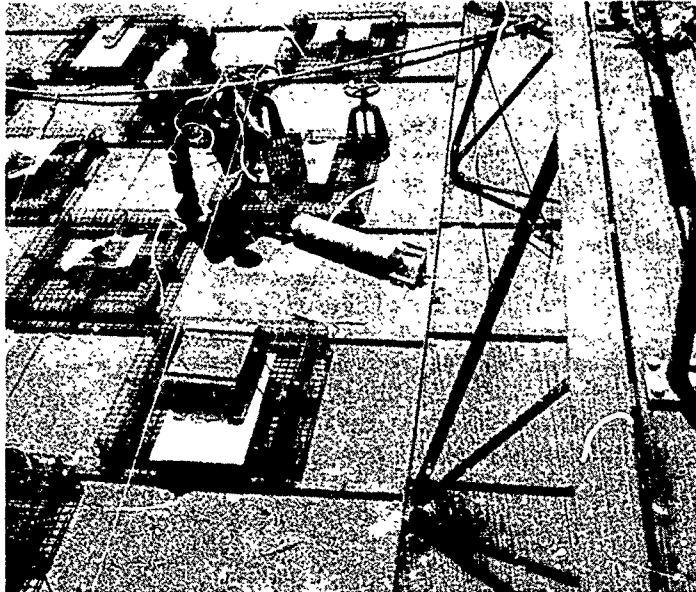


Figure 6. - Broken Fastening Straps on a Test Item



Figure 7. - Example of Charred Boxes After Exposure

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Figure 8. - Example of Blistered and Charred Plastics

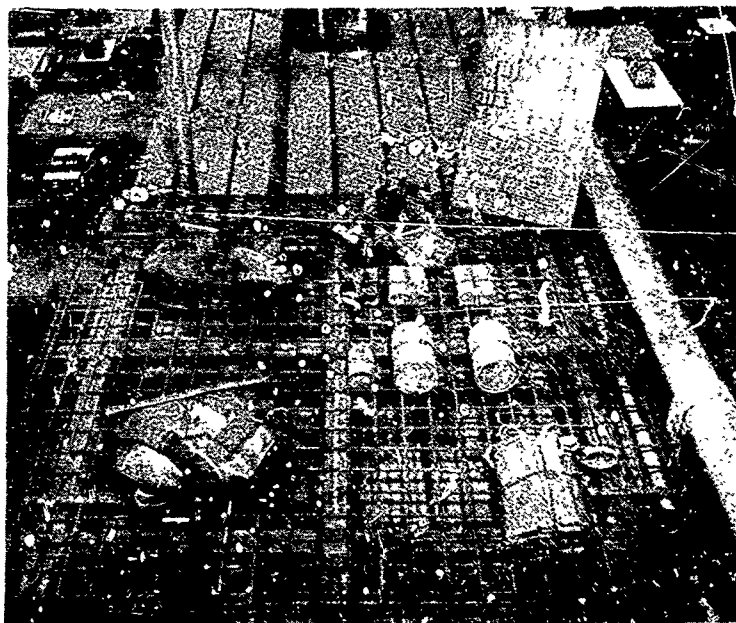


Figure 9. - Example of Melted Pliofilm Gas Masks

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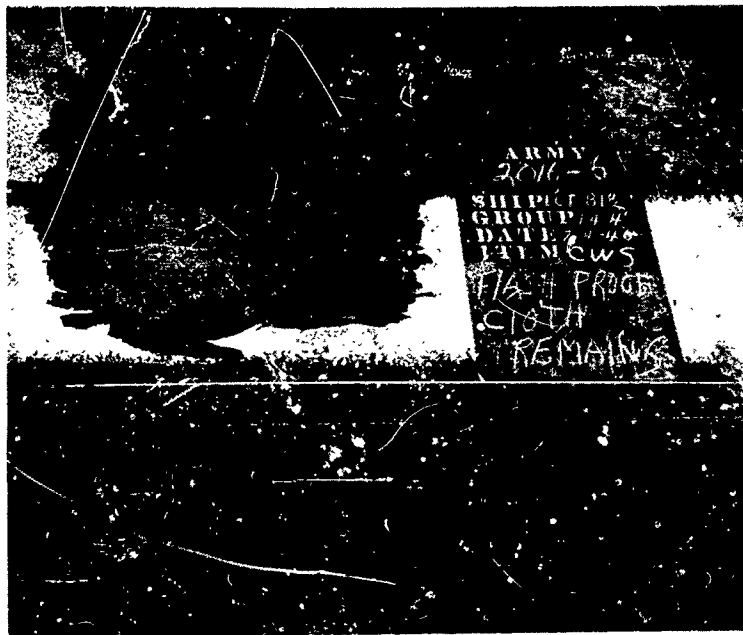


Figure 10. - Example of Burned Flashproof Cloth

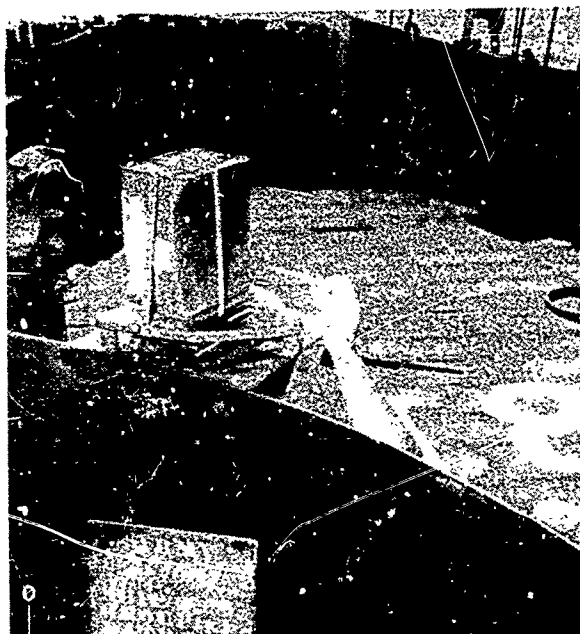


Figure 11. - Example of Blast on Metal Cans of Napalm

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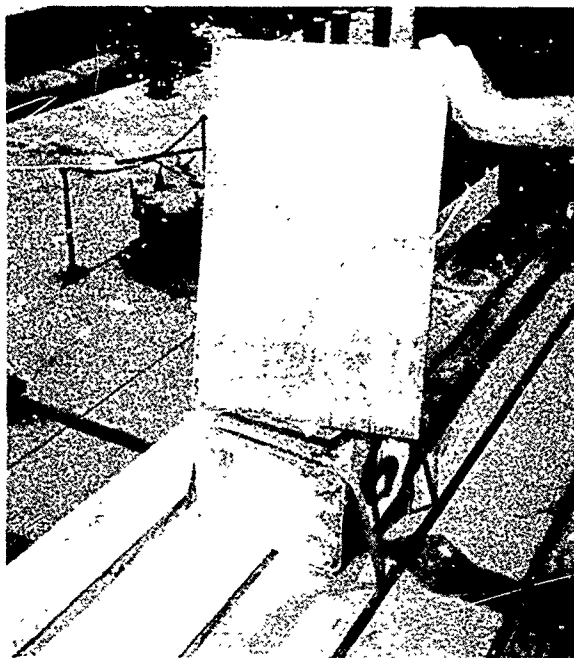


Figure 12. - Example of Pressure Wave on a Can of Napalm

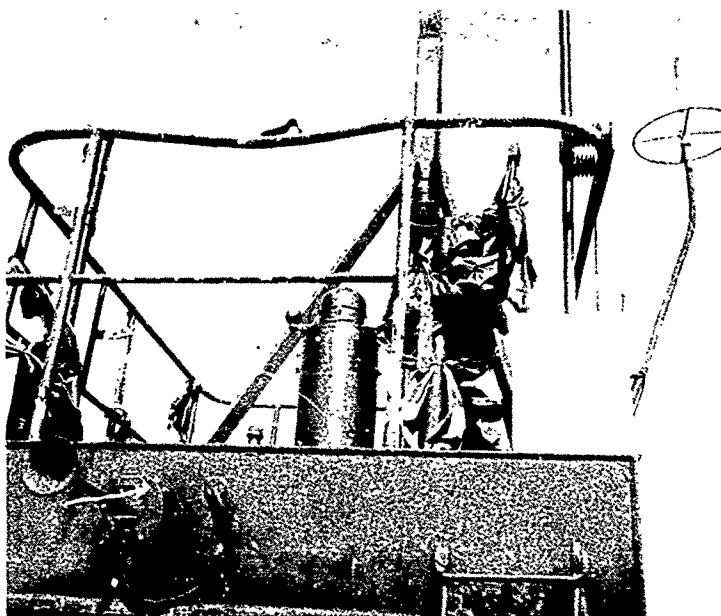


Figure 13. - Result of Heat and Blast on Coveralls

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Figure 14. - Result of the Blast on a Typical Display



Figure 15. - General View of the Effect of the Blast on the YOG 83.

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slight.

3. Radioactivity from the atomic bomb had no conclusive effect on any of the CWS test items. The test items have undergone laboratory analyses and functioning tests at the 42nd Chemical Laboratory Company. The two test items listed in Section V-A-1 must still undergo laboratory scrutiny on the USS BURLERSON (APA-67) and at Camp Detrick, Maryland. As mentioned previously, tests will be run again on 1 October 1946 in Hawaii for surveillance purposes on radioactive effects, and at any other time deemed necessary. All test items not thus far consumed in test procedures will be kept for one year at the Hawaiian Chemical Depot, Schofield Barracks, unless otherwise directed.

4. Shielding of test items was evident in several cases. This was caused by the natural swing of the small target craft about their bow anchors and could not be avoided. This condition proved conclusively, however, that shielding will protect items from the direct effects of the bomb. Neither heat, blast, nor radiation went around corners to effect CWS test items. This proves the very important point of protective shielding as a method of protection.

VI. DETAILED FACTUAL ACCOUNT OF TEST RESULTS

A. The detailed factual account of test results is herein presented. To make this section less cumbersome repeated reference to Appendix E will be made wherein are included the reports of laboratory investigation of the test items.

Agent, Decontaminating, M4

This test item on the YOG-83 was effected visibly by the heat. There were several cracks and some scorching on the box. The scorching destroyed the stencils "100 percent". (Figure 16). The evidence of scorching of this item diminished until on LST-220, the farthest from the burst, there was no evidence of scorching whatsoever. The laboratory analysis showed the active chlorine of the RH 195 was lower than minimum requirements by 1.34%. See Appendix E. - Report No. 1.

Bleaching Material (Grade 3)

This item was moved about one and one-half (1 1/2) inches forward on the catwalk of the YOG-83 where it was strapped. Figure 17 shows this item in the background before Test ABLE on YOG-83. The only damage was scorched containers on all target ships except the LST 220 and LCT 874 (approximately 3800 and 2500 yards from center of burst) where no visible damage was apparent.

The laboratory results show an increase in the dampness of the

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Figure 16. - Scorching of Light Colored Packaging

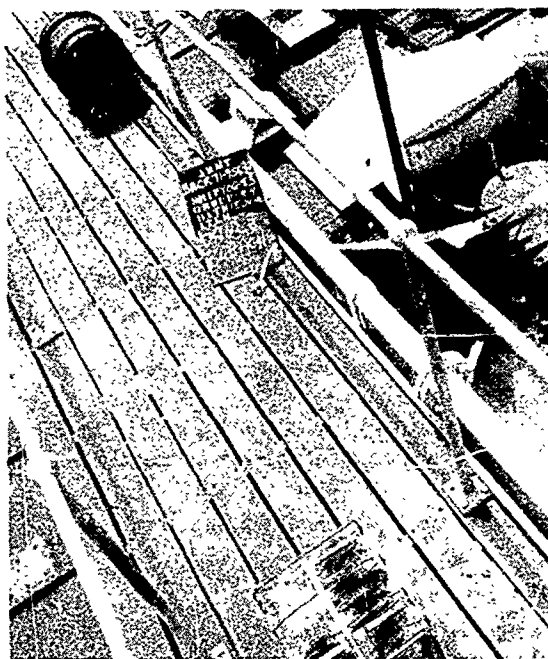


Figure 17. - Bleaching Material Before Test ABLE on the YOG 83.

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bleaching powder. Available chlorine was determined by the tri-turation - arsenite method. The values were below specification standards, but are not significant considering that unexposed samples were also below the minimum requirements of 30%. The amount of free chlorine varies from container to container and no conclusion from the results can be drawn. See Appendix E. - Report No. 2.

Bomb, Cluster, Incendiary, M6

This bomb, in its light gray painted metal container, was in no way effected by the atomic bomb burst. This incendiary bomb appeared to be in the exact condition after test ABLE as it was before (Figure 18) except for slight rusting. The following pictures are from the LST 52 (Figure 18) and LCT 818 (Figure 19). It is believed that the light gray metal container reflected the heat. This item was shielded on LCT 874, a condition which was unavoidable.

The bombs in the cluster functioned normally. There was no difference between the exposed and control sample. See Appendix E. Report No. 3 and 3A.

Bomb, Cluster, Incendiary, M12

The olive drab box which contained this bomb suffered severe scorching on the YOG-83. Evidence of scorching of this item was apparent as far as LST 661 (approximately 2300 yards from the center of burst). The bombs did not detonate as a result of this severe scorching, however. Figure 20, foreground, shows the M12 cluster on the YOG-83. Figure 19 shows both the M6 and the M12 incendiary clusters before Test ABLE on LCT 818. It is evident that the type of packaging used for the M12 cluster is easily scorched by the intense heat. Other than this scorching, however, there was no damage. The laboratory tests on the thickened oil filling showed a slight lowering in the Gardner Mobility which can be explained as due to exposure to weather and additional handling. Nevertheless, the contents were still very good. See Appendix E. - Report No. 3 and 3A.

Bomb, 4 lb. Chemical Type, M-1, BW

The effect of the atomic bomb on this item was only noticeable on the YOG-83. There was no damage to this item on any of the other target ships except the USS INDEPENDENCE where the bombs could not be found. Figure 21 shows the two (2) -4 lb. BW bombs on the railing of the catwalk of the YOG-83 before Test ABLE. Figure 22 shows these same bombs after Test ABLE. As can be seen from the pictures just mentioned, the paint was burned off these two (2) bombs. Both had revolved ninety (90) degrees from the top of the catwalk railing where they had been wired. There were no visible holes, bends, or distortions of the metal bombs. It could not be ascertained whether or not the non-toxic agent contained in them had been damaged or released to the atmosphere. The laboratory reports of the analysis of

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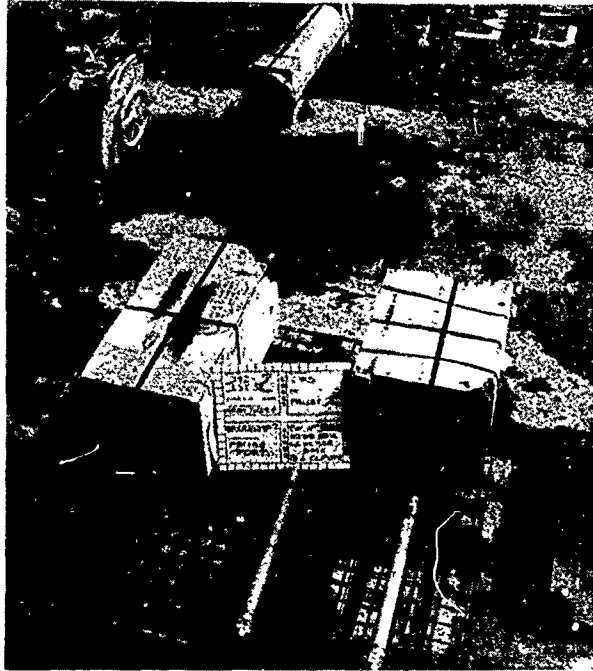


Figure 18. - M6 Incendiary Bomb Before Test ABLE

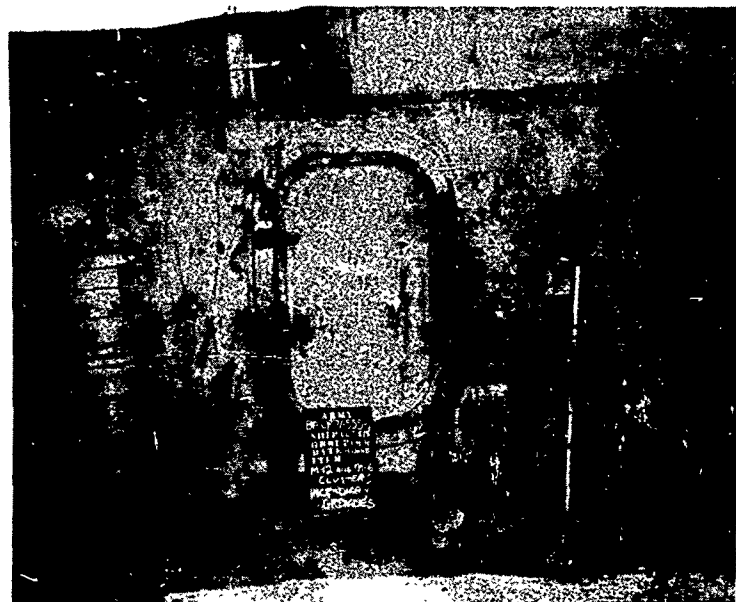


Figure 19. - M6 and M12 Incendiary Bomb Clusters before Test ABLE

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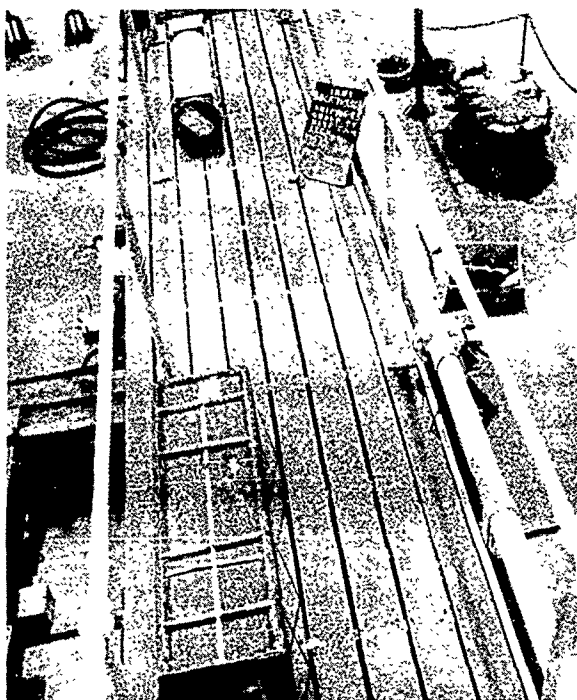


Figure 20. - The M12 Incendiary Cluster on the YOG 83



Figure 21. - The 4 lb. BW Bomb Display Before Test ABLE

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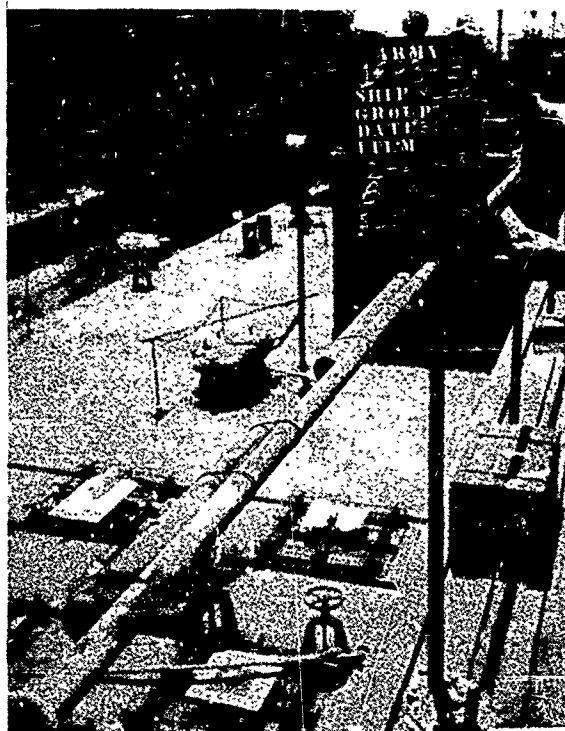


Figure 22. - The 4 lb. BW Bomb Display on the YOG 83
After Test ABLE

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the contents of these bombs are under the jurisdiction of Dr. Harold D. Batchelor, CWS representative with the Navy Bureau of Medicine and Surgery, and will be reported thru that unit.

Bomb, 100 lb, M47A2, BW

There was no apparent damage to this test item, except on the the YOG-83 and LST 52, which was of a secondary nature but caused by the blast. This type bomb which was displayed on the USS INDEPENDENCE, as well as the 4 lb BW bombs, was missing. Figure 21 shows this 100 lb BW bomb on the catwalk of the YOG-83. Figure 6 shows the same bomb on the deck of the YOG-83, where it was blown by the blast of the atomic bomb. Its former location can be seen on the catwalk. Figures 23 and 24 show the 4 lb BW bomb and the 100 lb BW bomb display on the flight deck of the carrier USS INDEPENDENCE before the Test. On the LST 52 the blast effect of the atomic bomb tore this test item loose from its strapping. This was the only damage. Figure 25 shows the bomb in its secured position before Test ABLE. Figure 26 shows this same bomb after Test ABLE in the position it was blown by the blast. The special BW bomb display on the other target ships were unharmed. Figure 27 shows the display on the USS NEVADA; Figure 28 and Figure 29 the display on the USS SALT LAKE CITY; and Figure 30 the display on the transport USS FALLON. All special BW bomb displays were removed after Test ABLE by the Chemical Warfare Unit and taken to the USS BURLINSON (APA-67) for further study and analysis. The laboratory reports of the analysis of the contents of these bombs as in the case of the previous test item are under the control of Dr. Harold D. Batchelor.

CC₂

Samples of this item in unpainted metal cans were displayed on the six (6) CWS target ships. There was no visible damage to any of these displays as a result of the atomic bomb. The cans, however, showed the effects of normal exposure to weather. In two (2) instances the cans were replaced before Test ABLE due to the normal weathering conditions which caused the cans to rust through. Figure 31 shows a sample display of CC₂ prior to Test ABLE on LST 52.

Laboratory analysis showed an increase in moisture content and an overall decrease of approximately 0.70% in active chlorine. Nothing was traceable to the effect of the atomic bomb. See Appendix E, - Report No. 4.

Cloth, Flashproof, Protective

Damage to this item by heat and blast was severe in all cases except on the LST 220 and on the LCT 874. No trace of this cloth could be found on the LCT just mentioned. It was blown away as a result of the blast in Test ABLE. Figure 32 shows the flashproof cloth secured in place before the blast on LCT 874.

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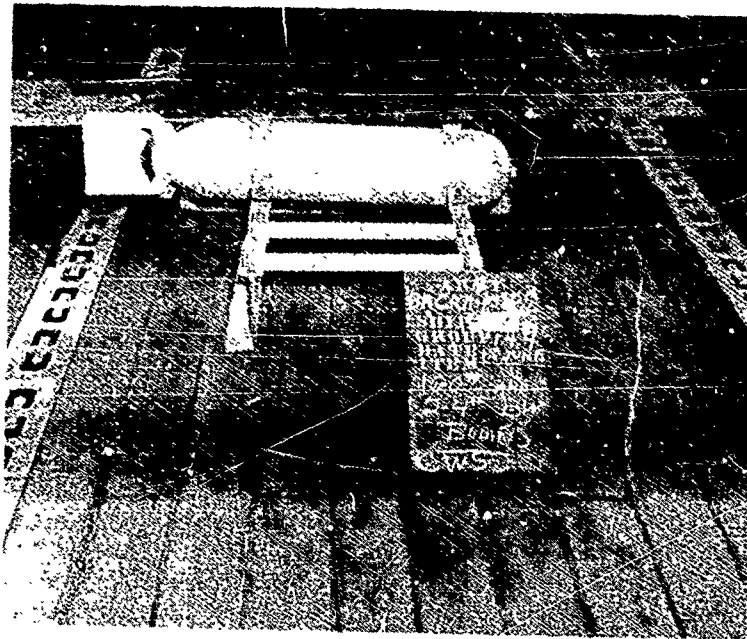


Figure 23. - Front View of BW Bomb Display on the Carrier INDEPENDENCE

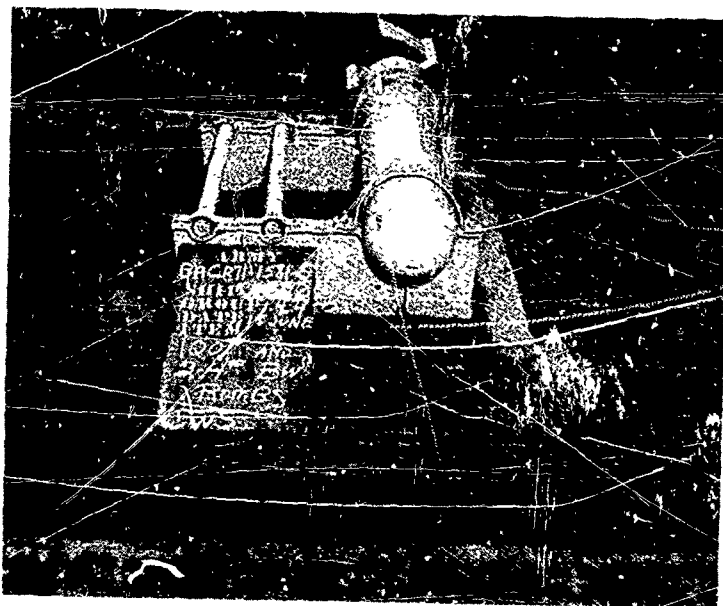


Figure 24. - Side View of BW Bomb Display on the Carrier INDEPENDENCE

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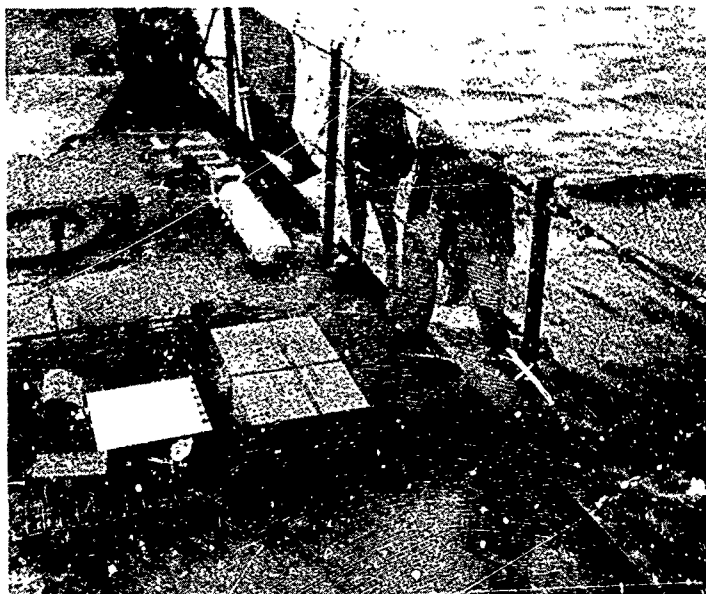


Figure 25. - The 100 lb. BW Bomb Before Test ABLE on LST 52



Figure 26. - The 100 lb. BW Bomb After Test ABLE on the LST 52

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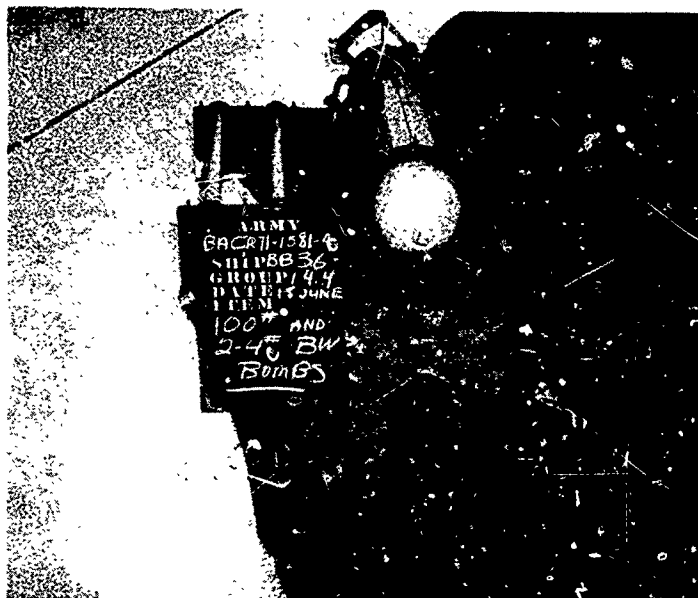


Figure 27. - The BW Bomb Display on the USS NEVADA Before Test ABLE



Figure 28. - The 100 lb. BW Bomb Before Test ABLE on the USS SALT LAKE CITY

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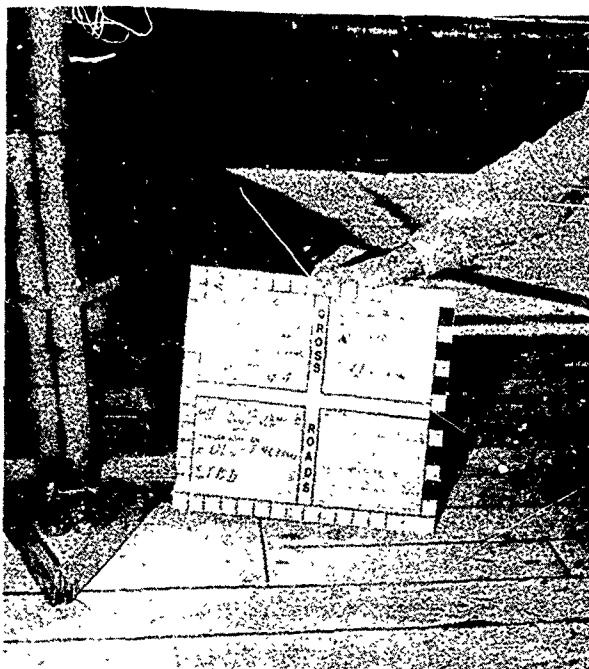


Figure 29. - The 4 lb. BW Bombs Before Test ABLE on the
USS SALT LAKE CITY

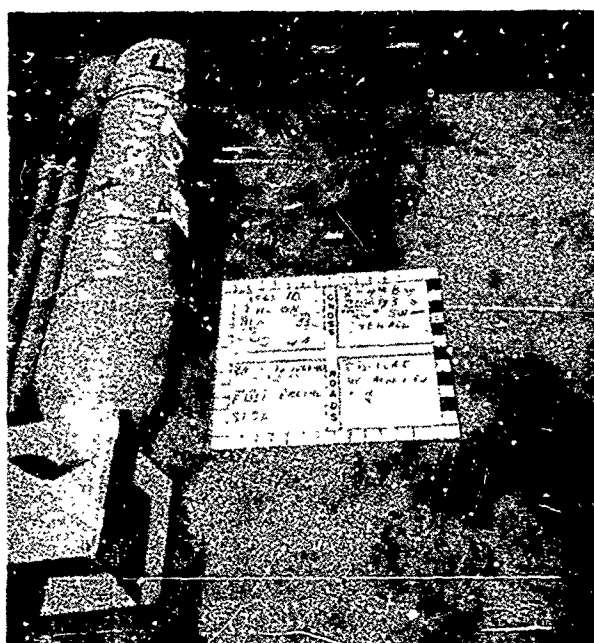


Figure 30. - The BW Bomb Display on the USS FALLON Before
Test ABLE

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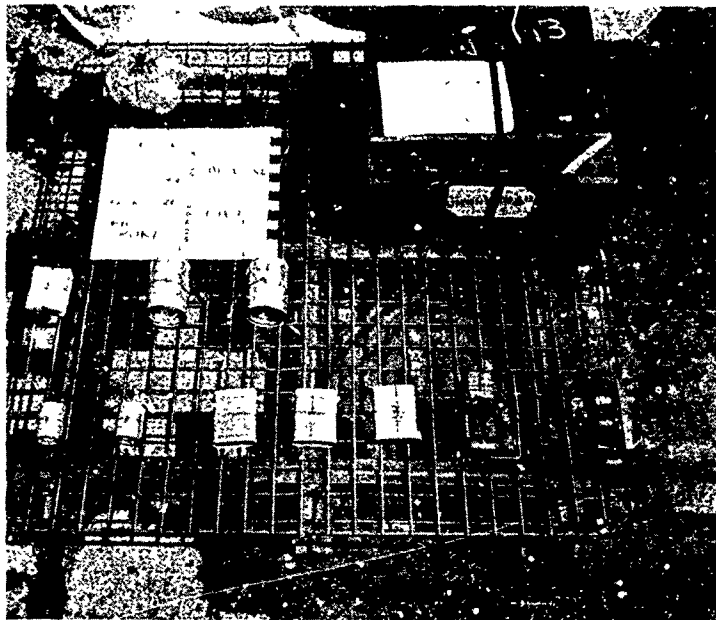


Figure 31. - Sample Display of CC₂ Prior to Test ABLE



Figure 32. - Flashproof Cloth Display on LCT 874 Before Test ABLE. (Over Life Raft)

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One (1) layer of flashproof cloth was burned into charred remains as far as 1500 yards from the blast. At distances of 2300 yards from the blast folds in the flashproof cloth were scorched and the strength of the material was gone in these folds. Figure 33 shows this scorching of the flashproof cloth referred to above. Figure 34 shows a piece of flashproof cloth in display on LCT 818 before Test ABLE. Figure 10 shows the remains of this same cloth in a burned and charred condition. An interesting phenomenon took place on the YOG-83. Flashproof cloth was wrapped around the foremast in three (3) layers. (See Figure 35). The results of the atomic heat were the scorching and blistering of the mast and the burning of the top layer of flashproof cloth. The section of the mast under the second and third layers remained unharmed. (See Figure 36). Also note the effect of the atomic bomb explosion on the ship's bell. See Appendix E for results of laboratory tests. - Report No. 5.

Clothing, Impregnated, (Coveralls)

The same conditions that existed with the flashproof cloth existed with the impregnated clothing display. Coveralls in the display on the LST 220 were visibly unharmed by the atomic bomb blast and heat. As in the case of the flashproof cloth on the LCT 874, the impregnated clothing likewise could not be located after Test ABLE. Secured corners could not even be found. The coveralls on the other target ships received graded degrees of damage. On the YOG-83 and LST 52, only the charred, secured corners remained. See Figure 14 (YOG-83) and Figure 37 (LST 52). Figures 3 and 25 show the impregnated coveralls on the YOG-83 and LST 52 prior to Test ABLE respectively.

On LCT 818 and LST 661 the blast did not tear away these coveralls. However, they were torn into tatters by the blast and scorched by heat. Figure 38 shows the impregnated clothing on the LCT 818 before Test ABLE and Figure 13 shows this same clothing after Test ABLE. Figures 39 and 40 show the impregnated coveralls on the LST 661 prior to and after Test ABLE respectively. The complete laboratory report on this item appears in Appendix E. - Report No. 6.

The QMC Unit subjected all types of impregnated clothing to the effects of the bomb and will report on same.

Crayon, Vesicant Detector

The only damage to this item occurred on the YOG-83 and LCT 818, 1000 and 1500 yards from the center of burst, respectively. The paper covering was, in both cases, torn, burned slightly, and the wax packaging tacky. This item is directly beside the gas mask in the background of Figure 9. As displayed on LST 52, 1500 yards from the center of burst, this item received only slight damage due to accidental shielding. The laboratory report using the Munsell System Color Chart appears in Appendix E. - Report No. 7

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Figure 33. - Example of Scorched Flashproof Cloth After Test ABLE Exposure



Figure 34. - Flashproof Cloth Display on LCT 818 Before Test ABLE

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Figure 35. - Flashproof Cloth Display on YOG 83 Before Test ABLE. (Wrapped Around Mast)



Figure 36. - Same Flashproof Cloth Display on YOG 83 After Test ABLE. (Notice Ship's Bell)

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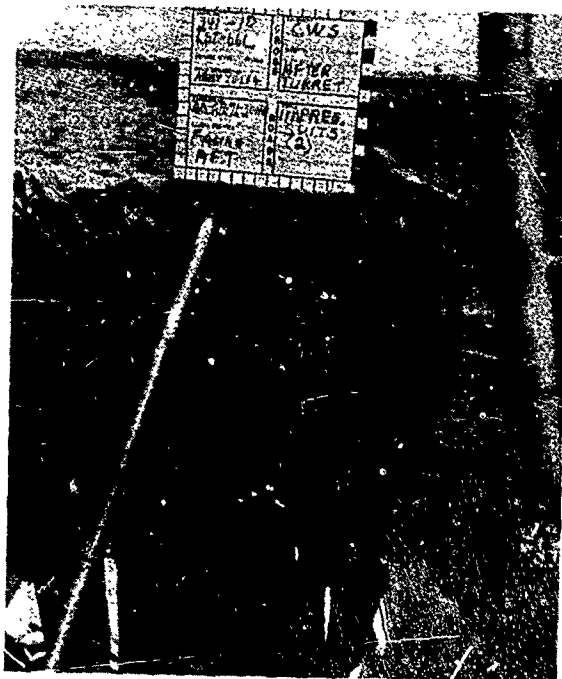
Figure 37. - Coveralls After Test ABLE on LST 52



Figure 38. - Impregnated Coveralls Before ABLE on LCT 818

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Cylinder, Ignition, PFT, M1

This item was displayed in its shipping package on all target ships. The only visible damage was scorching and slight charring of this package up to 1500 yards from the center of burst. No ignition cylinders were set off as a result of the heat. Figure 41 shows a sample display on the YOG-83. For functioning tests see Appendix E, Report No. 8.

Grenade, Hand, Smoke, WP

This item was displayed both boxed in its shipping package and individually in its tar cardboard container. In all cases the shipping box was scorched on the side exposed to the blast up to approximately 2300 yards from the center of the burst. This grenade, displayed individually in its container, received no visible damage even though the tar cardboard package in each case was slightly tacky, blistered and the sealing tape melted to distances of approximately 1500 yards from the center of burst. Figure 42, left center, shows sample display of this grenade both packaged and unpackaged as appearing on LCT 818 prior to Test ABLE.

The laboratory report on functioning may be found in Appendix E, Report No. 8 and 8A. All grenades, including the following several types functioned normally.

Grenade, Incendiary, AN-M14

As in the case of the WP Grenades just mentioned, the shipping packages of this item were scorched up to distances of 1500 yards and the tar cardboard containers were tacky and slightly blistered. Figure 43, foreground, shows sample display of the shipping package as appearing on LCT 874 prior to Test ABLE. Functioning tests - See Appendix E, Report No. 8 and 8A.

Grenade, Smoke, M18, Red

The same type of damage as explained in the case of the Incendiary Grenades existed up to 2500 yards in the case of this test item. Figure 44 gives a clear picture as to the display of all colored smoke grenades including both the shipping package and the individually exposed grenades in their tar cardboard containers as appearing on YOG-83. All colored smoke grenades functioned normally and colors were in agreement with standards, See App. E, Report 8 & 8A.

Grenade, Smoke, M18, Yellow

The same type of damage as in the case of RED Smoke Grenades previously mentioned was apparent in the case of the YELLOW Smoke Grenades up to only 2300 yards. For a sample display refer to Figure 44. See Appendix E, Report No. 8 and 8A.

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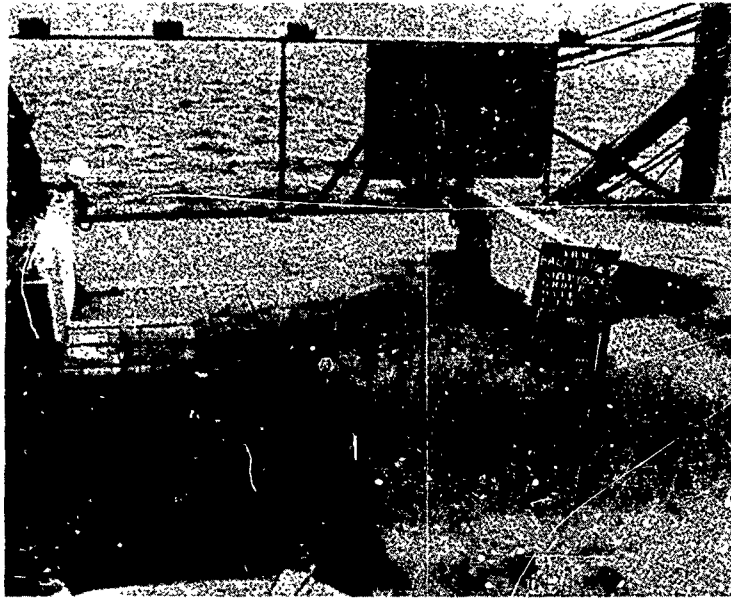


Figure 41. - Ignition Cylinders in Display on YOG 83
(Notice Individual Grenades on Railing)



Figure 42. - Sample Display of WP Grenades (Left Center)

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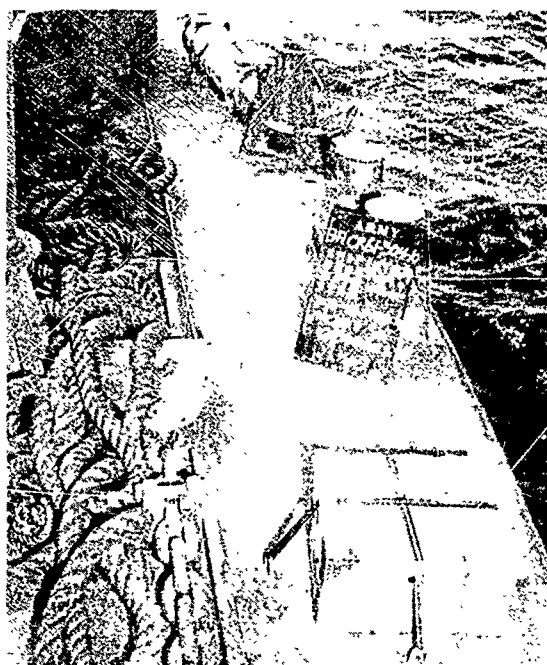


Figure 43. - Sample Display of the Incendiary Grenades in Packaging Before ABLE (Foreground)

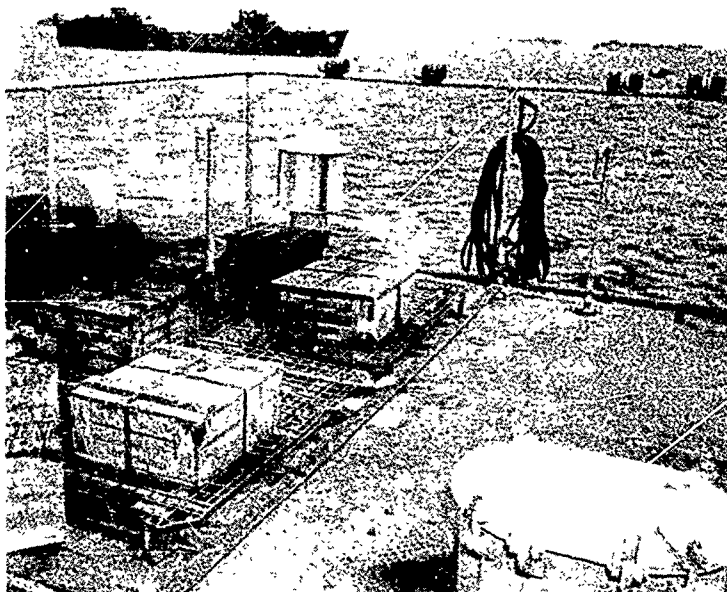


Figure 44. - Sample Display of Colored Smoke Grenades Before ABLE (YOG 83)

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Grenade, Smoke, M18, Green

Damage to this item as outlined in the above case existed up to only 1500 yards from the approximate center of burst. Likewise, see Figure 44 for sample display on the YOG-83. See Appendix E. - Report 8 and 8A.

Grenade, Smoke, M18, Violet

Damage suffered by the effects of the atomic bomb on this item, both packaged and in its original container, increased to 2300 yards. The varying degrees of the damage existing with respect to the above six (6) grenade test items, was due wholly on in part to the effects of probable shielding. Again refer to Figure 44 for sample display as appearing on the YOG-83. See Appendix E. - Report 8 and 8A.

Igniter, E3R1

This item was displayed only individually in its tar cardboard container. An example of the method of display can be seen in Figure 3 to the right of the coveralls.

There was no apparent visible damage to the Igniter, E3R1, even though its container was scorched and blistered and the sealing tape melted at distances of 1500 yards from the approximate center of burst.

Results of functioning tests appears in Appendix E. Functioning was normal. See Report No. 8.

Kit, Chemical Agent, Detector, M-9

This item was displayed on six (6) CWS target ships both individually as a kit and boxed in its original shipping package. The shipping packages of these M-9 kits were slightly charred, and scorching up to distances of 2300 yards from the blast was also evident.

The canvas carriers of the individually exposed detector kits were scorched slightly on the side exposed to the blast up to the same distances as mentioned above. See Figure 9 for an example of the individually exposed kits. There was one (1) interesting exception, however, on LCT 813. This individually exposed kit was strapped to the railing on the signal bridge. (See Figure 45). It was found on inspection after Test ABLE that this kit had been destroyed by fire. Only ash and the small glass sampling tubes remained. (See Figure 46). No other fires were noted on this LCT.

The reason for the burning of this individual kit is difficult to explain. In correlation with other damage throughout the Task Force, it has been suggested that a frayed section of the carrier may have caught fire from the intense heat and thus consumed the entire detector kit.

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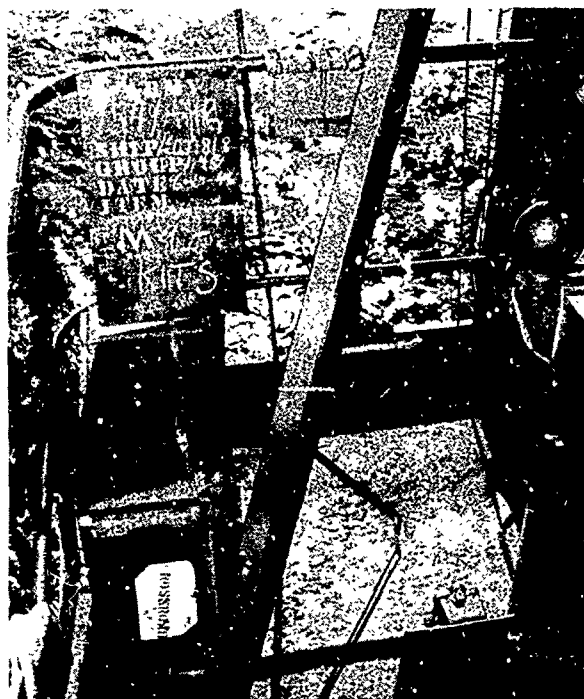


Figure 45. - M9 Detector Kit Strapped to Railing of LCT 818
Before Test ABLE



Figure 46. - The M9 Detector Kit Remains After Test ABLE
on the LCT 818. (Notice Only Ash Remains)

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Figures 31 and 45 show sample displays of the M-9 detector Kits in their original shipping boxes. The effectiveness of this detector kit was in no way impaired as a result of the atomic bomb. See Appendix E. - Report No. 9.

Kit, First Aid, Gas Casualty

This item was displayed on all six (6) CWS target ships. In some cases the kits were of the yellow painted variety and in other cases of the olive drab painted variety. There was no apparent visible damage to any of these metal kits. In Figure 25, lower-left hand corner a sample display of this First Aid Kit can be seen. See Appendix E Report No. 10 thru 10D.

Kit, Food Testing, Screening

The plastic medical kit showed effects of the intense heat up to 1500 yards from the center of burst. The cellophane-like covering of the kit and the sealing tape were burned away. The plastic box blistered and the strapping wires cut into the corners in such a manner as to indicate that at one time this plastic was in a semi-molten state. There appeared to be no visible damage to the contents of this kit. This kit, as displayed on LST 52, was accidentally shielded by a 4 x 4 timber blown on to it prior to the heat wave. (See Figure 47).

An excellent example of damage to this kit can be seen in Figure 8 as it appeared on the YOG-83.

Laboratory investigation of this test kit appears in Appendix E, Report No. 11.

Kit, Ointment, Protective

This item was displayed both individually and in its shipping package. The shipping packages were slightly scorched and charred up to a distance of 2300 yards from the center of burst. The individually exposed items in their light gray painted metal containers received no apparent damage on any of the six (6) target ships. An example of this individually exposed kit after Test ABLE can be seen in Figure 9 of this report.

The laboratory tests showed the contents of the exposed kits were in very good agreement with the controls. There was no variance from specifications. See Appendix E, Report No. 12.

Kit, Poisoned Water Treatment & Analysis

Damage suffered to this olive drab painted wooden medical kit was charring and scorching on the sides exposed to the blast up to distances of 2300 yards from the center of burst. Where the surfaces

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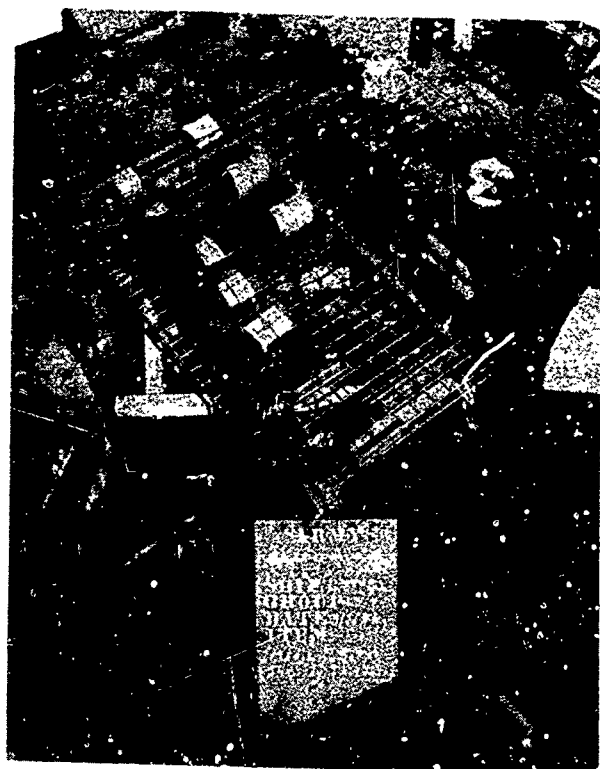


Figure 47. - Accidental Shielding of Medical Items by
a 4 X 4 Timber Blown There Prior to Test
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were charred, the nomenclature painted in black on the kit was obliterated. The canvas carrying handle in all cases remained unharmed. Figure 25 shows a sample display of this kit prior to Test ABLE. See Appendix E. - Report No. 13 thru 13C.

Kit, Treatment, Gas Casualty

This medical kit suffered damage in much the same manner as did the Poison Water Treatment & Analysis Kit. It was exposed in the same manner and the box was made of the same material. Scorching and charring of this box was evident up to 1500 yards from the approximate center of burst. Damage would probably have been attained to approximately 2300 yards had this item not been unexpectedly shielded by the after gun turret on LST 661. The black labeling on this box was, likewise, obliterated where it was charred. A sample view of this item before Test ABLE can be seen on the ventilator in the approximate center of Figure 48. This same photo shows a general view of the starboard side of LST 220 before Test ABLE. See Appendix E, for laboratory report. - Report No. 14 thru 14D.

Kit, Water Testing, Screening

This plastic medical kit received the same type of damage as did its counter-part, the Food Testing and Screening Kit. Blistering of the container and the burning of the sealing tape and cellophane-like covering was evident on inspection of this kit.

There was evidence also that this kit, at one time, was in a semi-molten state due to the impressions left in it by its securing wires. (See Figure 49). Damage to this type of plastic existed out to approximately 1500 yards. This item was, likewise, shielded on LST 52 by the presence of a 4x4 timber blown on to it prior to the heat wave. (See Figure 47).

The laboratory report of this test item appears in Appendix E. - Report No. 15.

Mask, Gas, Headwound, M7-11-9

This mask was displayed both in its original weather packaging and individually in its pliofilm carrier. The weather packaging box was scorched out as far as 2300 yards from the approximate center of burst. This was the only apparent damage to the package noted. The masks contained therein were undamaged. The individually exposed item in the pliofilm carrier presented a different picture, however. The thin pliofilm of both the carrier and the mask were melted into useless scraps up to distances of 1500 yards. (See Figures 9, 50, 51, and 52). Severe scorching to the item was evident on LST 661 which was 2300 yards away. In the upper left hand corner of Figure 31 a sample exposure before Test ABLE of the headwound mask can be seen.

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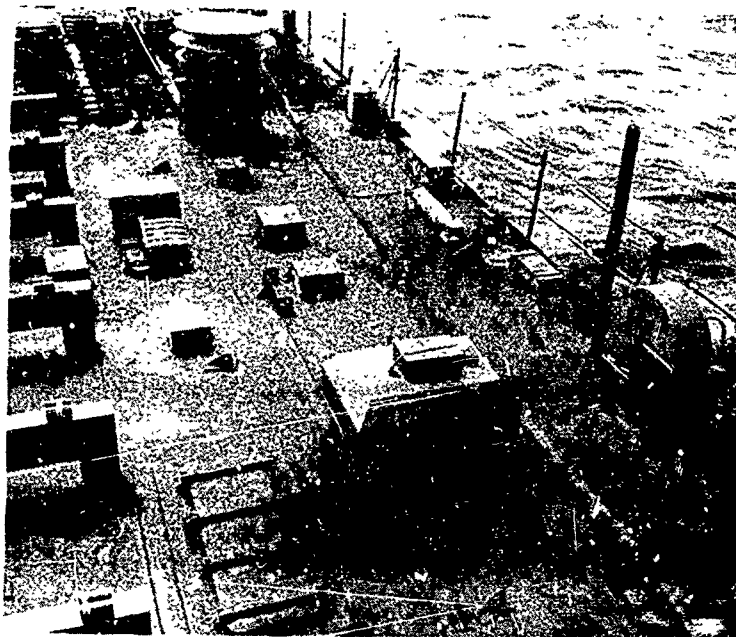


Figure 48. - Sample Display of Gas Casualty Treatment Kit Before Test ABLE. (On Ventilator - Center) .



Figure 49. - Water Testing, Screening Kit on YOG 83 After Test ABLE.

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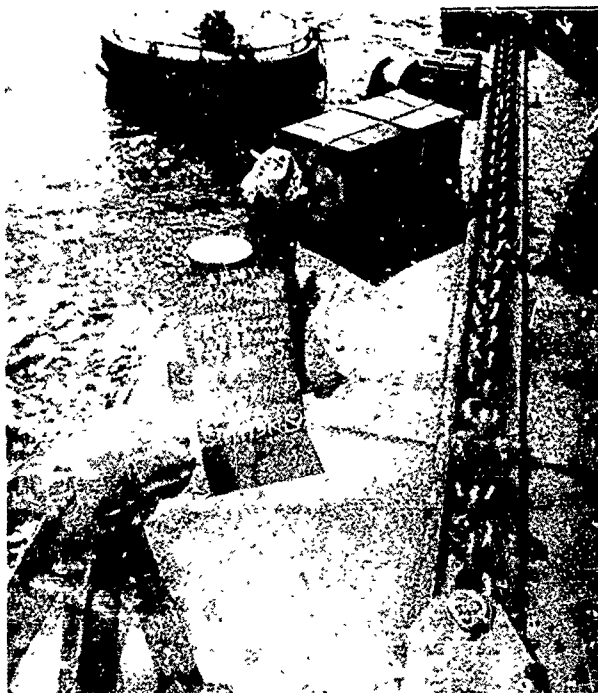


Figure 50. - Melting of the Headwound Gas Mask as a Result of Test ABLE. (LCT 818)

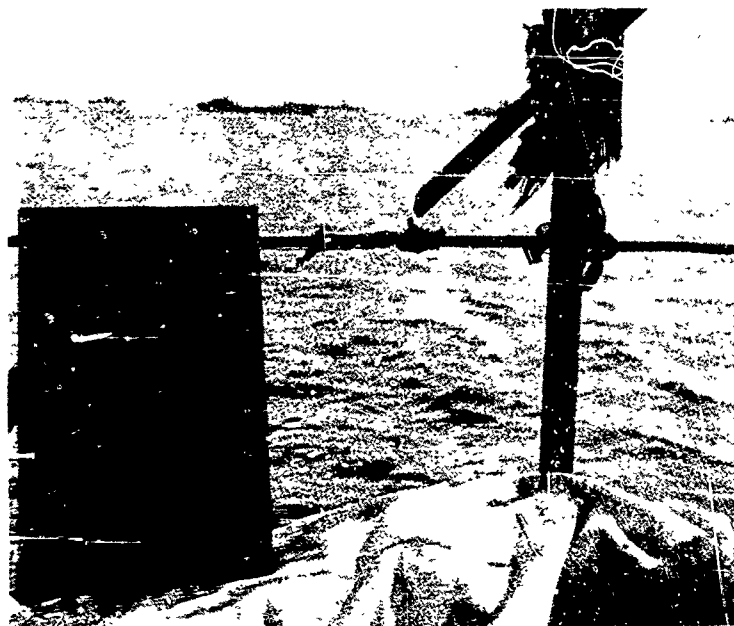


Figure 51. - Melting of the Headwound Gas Mask as a Result of Test ABLE. (LST 52)

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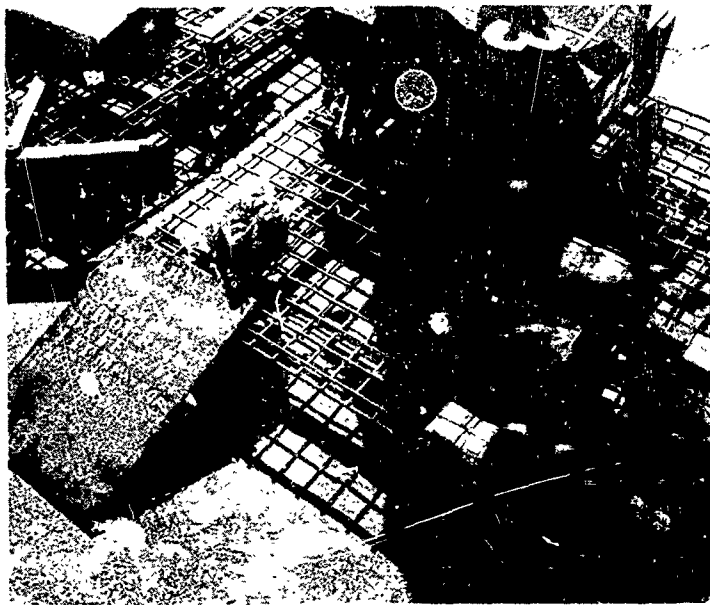


Figure 52. - Melting of the Headwound Gas Mask as a Result
of Test ABLE. (LST 52)

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The cannisters withstood the effects of the atomic bomb, but the pliofilm received varying degrees of direct damage. Eyepieces were unaffected. See Appendix E for results of laboratory tests. - Report No. 16.

Mask, Gas, Service, M3-10A1-6

This mask was displayed on the six (6) CWS target ships both in its shipping package and individually as under field conditions. (See Figures 5 and 53). The boxes were slightly scorched up to approximately 2500 yards from the center of burst. The masks exposed individually, both in the rubber and canvas carriers, were undamaged. There was slight scorching of the carriers. The carriers appeared to give ample protection to the mask contained therein. Laboratory reports substantiate this observation. See Appendix E. - Report No. 17.

Mask, Gas, Service, (Butyl) MIT

This mask was displayed in both small olive drab painted wooden boxes and in a light cardboard box. The wooden packaging can be seen in the center of Figure 54 and in the foreground of Figure 55. The cardboard container can be seen in the right center of Figure 54. The wooden packaging was scorched up to 2300 yards, whereas the cardboard container was in no manner damaged at any distance. This presents a good comparison with respect to heat between dark wooden packaging and light colored cardboard packaging. See Appendix E for supplemental laboratory reports. - Report No. 18.

Napalm

This item was displayed in an olive drab painted can. The can was scorched to varying degrees up to approximately 1500 yards from the center of burst. On the YOG-83, the lid was blown off, but the contents remained unspilled. (See Figure 12). On LCT 818 the side of the can exposed to the blast was caved inward. (See Figure 11). The laboratory tests show the results of excessive moisture in the napalm. The consistency dropped rapidly. The apparent damage to the napalm appears to be the result of the moist atmosphere at Bikini rather than as a result of Test ABLE. See Appendix E. - Report No. 19.

Paint, Liquid, Vesicant Detector

This detector paint was displayed in its small can, as can be seen in the lower left hand corner of Figure 31. There was no visible damage to the can or its contents except slight leakage around the lid on the cans within 1500 yards from the approximate center of the burst. The label of the can in the display on the YOG-83 was burned. There was, however, usual evidence of weathering on the metal containers on all CWS target ships.

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Figure 53. - Sample Gas Mask Display Before the Test
(LCT 874)



Figure 54. - Display of the Butyl Gas Mask in Its Packaging
(Center of Illustration)

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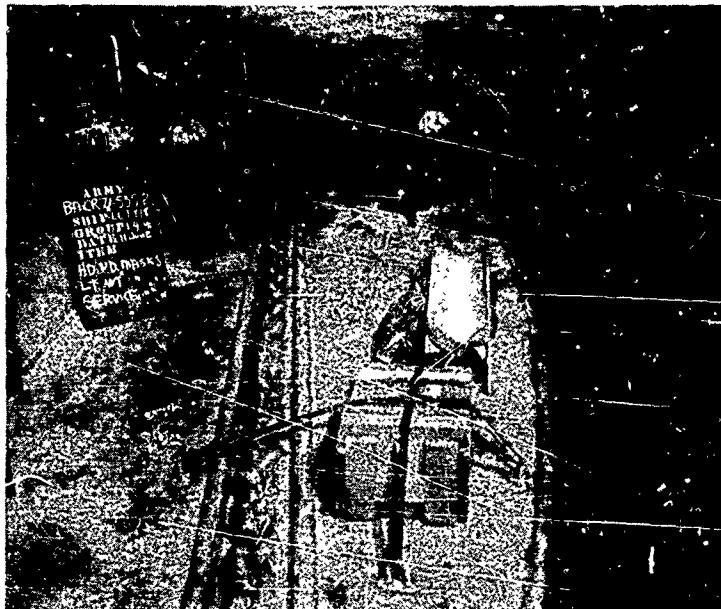


Figure 55. - View of Sample Display of the Butyl Gas Mask in Its Packaging.

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The sensitivity of the paint was within the specifications and was unaffected by the atomic bomb burst. See Appendix E. - Report No. 20 and 20A.

Pot, Smoke, Floating, M4A2

This floating smoke pot was displayed in its wooden package and can be seen in the center of Figure 56. The only apparent visible damage to this item was the usual charring and scorching of the wooden package up to approximately 2300 yards. The smoke pots functioned normally except for the non-functioning of some of the fuzes. See Appendix E. - Report No. 21.

RH 195

This item was displayed in a metal can identical to that of the CC2 previously mentioned in this report. See the center of Figure 31. The only visible damage was that caused by the normal weathering and rusting of the unpainted cans. Prior to Test ABLE, the display of RH 195 on LCT 818 had to be replaced from reserve stock due to the heavy rusting of the container. See results of laboratory tests - Appendix E. - Report No. 22.

Shell, Smoke, WP, 4.2 Inch CM

This item was displayed in its normal two (2)-shell wooden box. (See Figure 57). The wooden box was scorched up to distances of 2300 yards from the approximate center of burst. The munition contained therein was not detonated.

Test firing of these shells showed no apparent defects. See Appendix E. - Report No. 23.

Shell, Smoke, FS, 4.2 Inch CM

These items were displayed in the identical manner as the WP shells just mentioned. (See Figure 57). Scorching of the two (2)-shell wooden box was in evidence up to the same distances. Likewise, this munition was not detonated.

Test firing of these shells, likewise, produced no apparent defect. See Appendix E. - Report No. 23

Shells, 105mm (1 ea: HD, HN1, CG, CK, GA)

These shells were exposed unpackaged as a unit on each CWS target ship. (See Figure 58 and 59). There was no apparent damage to any of the shells except slight indications of soot on the shells up to 1500 yards from the center of burst. Slight evidence of normal rusting was found on all shells. There were no leakers or ruptures.

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JOINT TASK FORCE ONE
TASK GROUP 1.4
TASK UNIT 1.4.4

FINAL REPORT

I. INTRODUCTION

A. Object of Test

1. The object of the test was to expose a selected cross-section of Chemical Warfare Service equipment and fillings to the effects of an atomic bomb in an effort to determine: (a) the effects of heat, blast, and radiations on packaging, chemical composition and functioning, and (b) if any changes, in design and chemical composition of Chemical Warfare items, are necessary in order to insure their effective use in and after exposure to the detonation of atomic bombs.

B. Conditions of Test

1. Several conferences were held at the Office of the Chief, Chemical Warfare Service, with representatives of the various sections to compile a cross-sectional list of Chemical Warfare items to be exposed. Items which overlapped into other technical services, or items which were not typical of the CWS fields of endeavor were omitted. The number and weight of test items was kept at a minimum to facilitate handling. (List of Equipment - see Section IV - Description of Materials and Test Conditions).

2. Displays of both packaged and un-packaged items were planned. In this manner both the weather packaging and individual item could be exposed to the bomb blast. Further, to secure exposure in a graded manner, target ships were selected starting at the 1000 yard ring and terminating at a ship 3200 yards away from the expected center of burst. Six (6) identical test sets were displayed by the Chemical Warfare Unit on the six (6) target ships assigned by the Director of Ship Material. These ships and distances from the USS NEVADA were:

YOG-83 - 1000 yds	LCT-874 - 2000 yds
LCT-818 - 1200 yds	LST-661 - 2300 yds
LST-52 - 1500 yds	LST-220 - 3200 yds

3. All test items, whether packaged or individually exposed, were securely fastened to the ships assigned by metal strapping. In most cases pallets or padeyes were welded to the decks of the ships in order to provide suitable strapping facilities. Cloth and clothing were securely fastened by doubling an end back over

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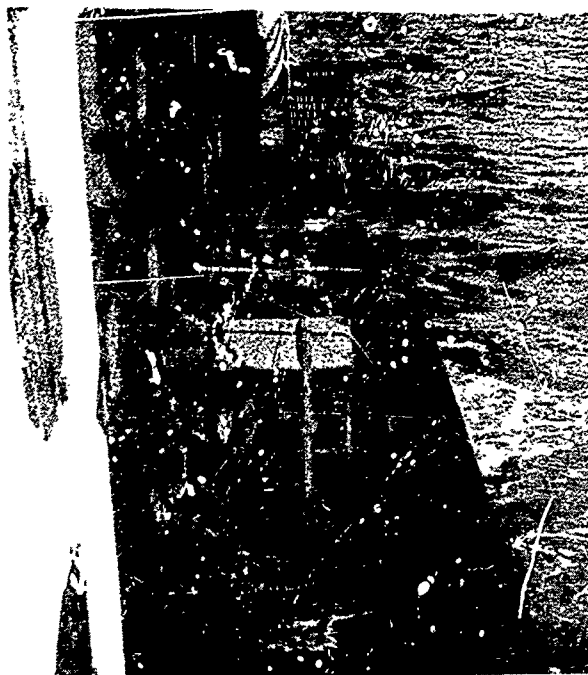


Figure 56. - Sample Display of the Floating Smoke Pot
Before Test ABLE. (LCT 818)

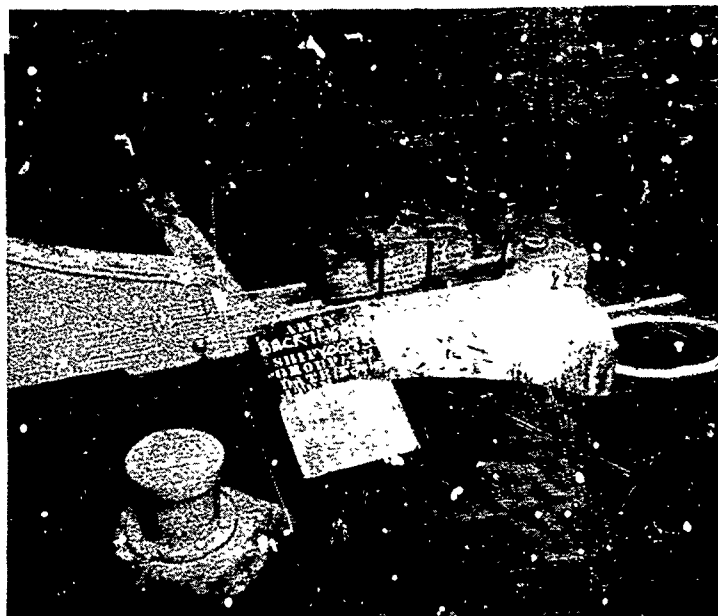


Figure 57. - Sample Display of Mortar Shells, 4.2 Inch
Before Test ABLE. (YOG 83)

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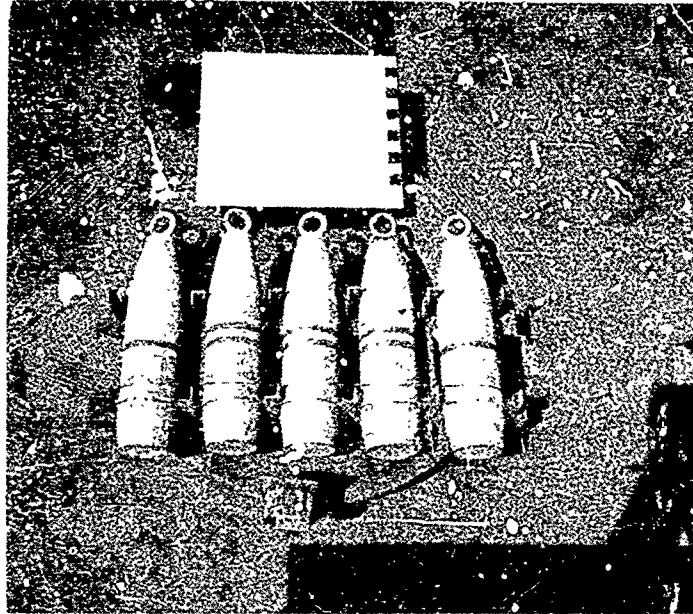


Figure 58. - Display of Gas Shells Prior to Test ABLE
on the LST 661

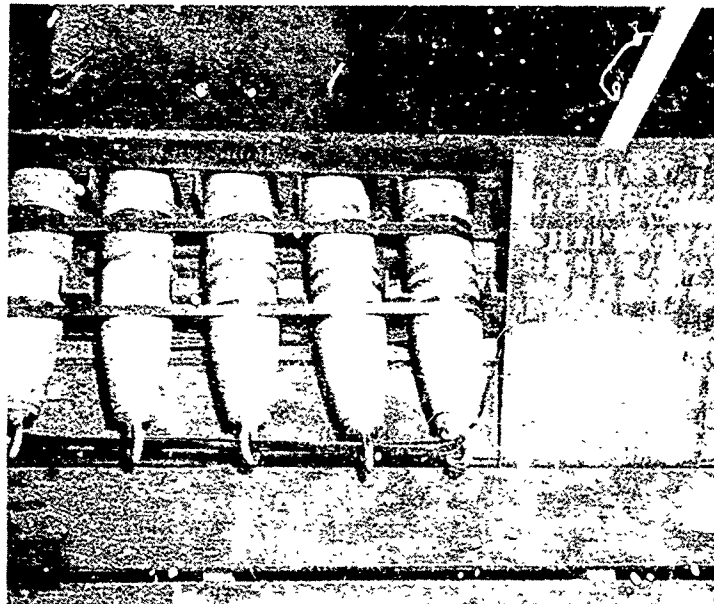


Figure 59. - Display of Gas Shells Prior to Test ABLE
on the YOG 83.

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Laboratory tests on the CG and CK showed no change in the composition of these gases. No laboratory tests were run on HD, HN1, and GA. These gases are being stored at the Hawaiian Chemical Warfare Depot, Oahu, T.H. For composition analysis of CG and CK See Appendix E. - Report No. 24 and 24A.

GENERAL NOTES

The Test Division, Technical Command, Edgewood Arsenal, Maryland will keep track of the exposed and control CWS items now stored at the Hawaiian Chemical Warfare Depot, Schofield Barracks, Oahu, T.H., and will request such additional functioning and laboratory tests as may be considered advisable.

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APPENDIX A

LIST OF PHOTOGRAPHS TAKEN

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APPENDIX A

LIST OF PHOTOGRAPHS TAKEN

A. USS NEVADA
BA-CR71-1581-3
BA-CR71-1581-4
AA-CR58-1993-10
AA-CR58-1993-11
AA-CR58-1993-12
AA-CR58-1973-11
AA-CR58-1973-12

B. USS INDEPENDENCE
BA-CR71-1581-5
BA-CR71-1581-6

C. USS SALT LAKE CITY
BA-CR92-1565-7
BA-CR92-1565-8

D. USS FALLON
BA-CR92-1565-10

E. YOG-83
BA-CR71-956-1
BA-CR71-956-2
BA-CR71-956-3
BA-CR71-956-4
BA-CR71-956-5
BA-CR71-956-6
BA-CR71-956-7
BA-CR71-956-8
BA-CR71-956-9
BA-CR71-956-10
BA-CR71-956-11
BA-CR71-956-12
BA-CR71-1581-1
BA-CR71-1581-2
AA-CR58-1993-1
AA-CR58-1993-4
AA-CR58-1993-5
AA-CR58-1993-6
AA-CR58-1993-7
AA-CR58-1993-8
AA-CR58-1993-9

F. LST-52
BA-CR71-342-1
BA-CR71-342-2
BA-CR71-342-3
BA-CR71-342-4
BA-CR71-342-5
BA-CR71-342-6
BA-CR71-342-7
BA-CR71-342-8
BA-CR71-342-9
BA-CR71-342-10
BA-CR71-342-11
BA-CR71-342-12
AA-CR98-1969-4
AA-CR98-1969-5
AA-CR98-1969-6
AA-CR98-1969-7
AA-CR98-1969-8
AA-CR98-1969-9

G. LST-220
BA-CR71-953-1
BA-CR71-953-2
BA-CR71-953-3
BA-CR71-953-4
BA-CR71-953-5
BA-CR71-953-6
BA-CR71-953-7
BA-CR71-953-8
BA-CR71-953-9
BA-CR71-953-10
BA-CR71-953-11
BA-CR71-953-12

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H. LST-661

BA-CR71-341-1
BA-CR71-341-2
BA-CR71-341-3
BA-CR71-341-4
BA-CR71-341-5
BA-CR71-341-6
BA-CR71-341-7
BA-CR71-341-8
BA-CR71-341-9
BA-CR71-341-10
BA-CR71-341-11
BA-CR71-341-12
AA-CR58-2010-1
AA-CR58-2010-2

J. LCT-874

BA-CR61-478-1
BA-CR61-478-2
BA-CR61-478-3
BA-CR61-478-4
BA-CR61-478-5
BA-CR61-478-6
BA-CR61-478-7
BA-CR61-478-8
BA-CR61-478-9
BA-CR61-478-10
BA-CR61-478-11
BA-CR61-478-12
BA-CR61-304-10
BA-CR61-304-11
BA-CR61-304-12

I. LCT-818

BA-CR71-555-1
BA-CR71-555-2
BA-CR71-555-3
BA-CR71-555-4
BA-CR71-555-5
BA-CR71-555-6
BA-CR71-555-7
BA-CR71-555-8
BA-CR71-555-9
BA-CR71-555-10
BA-CR71-555-11
BA-CR71-555-12
BA-CR79-1541-8
BA-CR79-1541-9
BA-CR79-1541-11
BA-CR79-1541-12
AA-CR94-2016-1
AA-CR94-2016-2
AA-CR94-2016-3
AA-CR94-2016-4
AA-CR94-2016-5
AA-CR94-2016-6

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APPENDIX B

LIST OF ILLUSTRATIONS

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APPENDIX B

LIST OF ILLUSTRATIONS

<u>FIGURE</u>	<u>SECTION</u>	<u>NUMBER</u>
Fig. 1	I-B-3	BA-CR71-342-3
Fig. 2	I-B-3	BA-CR71-956-8
Fig. 3	I-B-3	BA-CR71-1581-1
Fig. 4	I-B-3	BA-CR71-342-6
Fig. 5	IV-B-3	BA-CR71-341-9
Fig. 6	V-A-1	AA-CR58-1993-5
Fig. 7	V-B-1	AA-CR58-1993-8
Fig. 8	V-B-1	AA-CR58-1993-1
Fig. 9	V-B-1	AA-CR58-1993-11
Fig. 10	V-B-1	AA-CR94-2016-6
Fig. 11	V-B-2	AA-CR94-2016-1
Fig. 12	V-B-2	AA-CR58-1993-7
Fig. 13	V-B-2	AA-CR94-2016-2
Fig. 14	V-B-2	AA-CR58-1993-9
Fig. 15	V-B-2	AA-CR58-1993-10
Fig. 16	VI	AA-CR98-1973-12
Fig. 17	VI	BA-CR71-956-10
Fig. 18	VI	BA-CR71-342-7
Fig. 19	VI	BA-CR71-555-1
Fig. 20	VI	BA-CR71-956-11
Fig. 21	VI	BA-CR71-956-4
Fig. 22	VI	AA-CR58-1993-6
Fig. 23	VI	BA-CR71-1581-5
Fig. 24	VI	BA-CR71-1581-6
Fig. 25	VI	BA-CR71-342-12
Fig. 26	VI	AA-CR98-1969-8
Fig. 27	VI	BA-CR71-1581-4
Fig. 28	VI	BA-CR92-1565-7
Fig. 29	VI	BA-CR92-1565-8
Fig. 30	VI	BA-CR92-1565-10
Fig. 31	VI	BA-CR71-342-10
Fig. 32	VI	BA-CR61-478-11
Fig. 33	VI	AA-CR58-2010-2
Fig. 34	VI	BA-CR71-555-10
Fig. 35	VI	BA-CR71-956-12
Fig. 36	VI	AA-CR98-1973-11
Fig. 37	VI	AA-CR98-1969-7
Fig. 38	VI	BA-CR79-1541-11
Fig. 39	VI	BA-CR71-341-10
Fig. 40	VI	AA-CR58-2010-1
Fig. 41	VI	BA-CR71-956-7
Fig. 42	VI	BA-CR71-555-4

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Fig. 43	VI	BA-CR61-304-10
Fig. 44	VI	BA-CR71-956-6
Fig. 45	VI	BA-CR79-1541-12
Fig. 46	VI	AA-CR94-2016-5
Fig. 47	VI	AA-CR98-1969-9
Fig. 48	VI	BA-CR71-953-2
Fig. 49	VI	AA-CR58-1993-4
Fig. 50	VI	AA-CR94-2016-3
Fig. 51	VI	AA-CR98-1969-5
Fig. 52	VI	AA-CR98-1969-6
Fig. 53	VI	BA-CR61-478-5
Fig. 54	VI	BA-CR71-342-2
Fig. 55	VI	BA-CR71-555-2
Fig. 56	VI	BA-CR79-1541-8
Fig. 57	VI	BA-CR71-1581-2
Fig. 58	VI	BA-CR71-341-8
Fig. 59	VI	BA-CR71-956-2

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APPENDIX C

LIST OF SHIPMENTS AND CONSIGNEES

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APPENDIX C

LIST OF SHIPMENTS AND CONSIGNEES

- A. Commanding Officer, Camp Detrick, Frederick, Maryland
- 3 - Bomb, 100 lb, M47A2, BW
6 - Bomb, 4 lb, Chemical Type, M1, BW
- B. USS BURLESON (APA # 67)
- 9 - Bomb, 100 lb, M47A2, BW
18 - Bomb, 4 lb, Chemical Type, M1, BW
- C. Chief, Medical Division, CW Center, Edgewood Arsenal, Maryland
- 12 - Kit, First Aid, Gas Casualty
12 - Kit, Food Testing, Screening
12 - Kit, Poisoned Water, Treatment and Analysis
11 - Kit, Treatment, Gas Casualty
12 - Kit, Water Testing, Screening
- D. 42nd Chemical Laboratory Company, Schofield Barracks, Oahu, T.H.
- 9 - Box - Agent, Decontaminating, M4
9 - Box - Breaching Material, Grade 3
9 - Box - Bomb, Cluster, Incendiary, M6
9 - Box - Bomb, Cluster, Incendiary, M12
12 - Can - CC²
12 - Pieces - Cloth, Flashproof, Protective
12 - Suits - Clothing, Impregnated (Coveralls)
12 - Pkgs - Crayon, Vesicant Detector
9 - Box - Cylinder, Ignition, PFT, M1
9 - Box - Grenade, Hand, Smoke, WP
9 - Box - Grenade, Incendiary, M1-M14
9 - Box - Grenade, Smoke, M18, Red
9 - Box - Grenade, Smoke, M18, Yellow
9 - Box - Grenade, Smoke, M18, Green
9 - Box - Grenade, Smoke, M18, Violet
12 - Pkgs - Igniter, E3R1
12 - Box - Kit, Chemical Agent Detector, M9
9 - Box - Kit, Ointment, Protective
12 - Box - Mask, Gas, Headwound, M7-11-9
8 - Box - Mask, Gas, Service, M3-10A1-6
11 - Box - Mask, Gas, Service, (Butyl)
12 - Can - Napalm

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12 - Can - Paint, Liquid Vesicant Detector
9 - Box - Pot, Smoke, Floating, M4A2
12 - Can - RH195
9 - Box - Shell, Smoke, WP, 4.2 Inch, CM
9 - Box - Shell, Smoke, FS, 4.2 Inch, CM
9 - Box - Shell, Gas, 105mm (HD, HN1, GA, CK, CG)

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APPENDIX D

LAYOUTS OF CWS TEST DISPLAYS

TEST A

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LAYOUTS OF CWS TEST DISPLAYS

TEST A

SHIPS:

LST 52
LST 220
LST 661
YOG 83
LCT 818
LCT 874

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CWS TEST MATERIAL

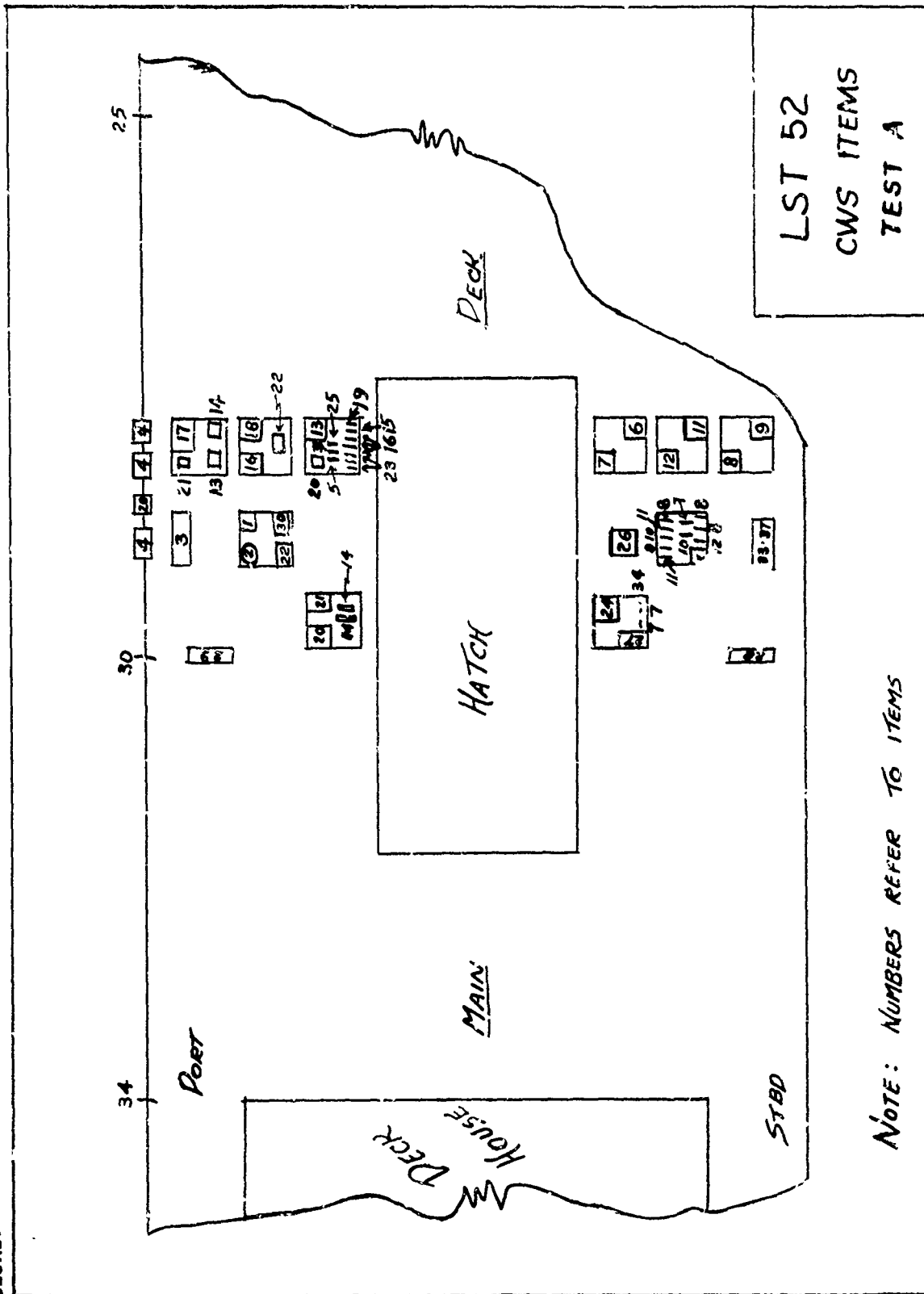
ITEM NO.

ITEM

1. Agent, Decontaminating, M-4
2. Bleaching Material (Grade #3)
3. Bomb, BW, 4 lb. Chemical Type, M-1
3. Bomb, BW, 100 lb. M47A2 (Inert Filling)
4. Cloth, Flashproof
5. Crayon, Vesicant Detector
6. Cylinder, Ignition, PFT, M-1
7. Grenade, Hand, Smoke, WP
8. Grenade, Hand, Incendiary, AN-M14
9. Grenade, Hand, Smoke, Red, M-18
10. Grenade, Hand, Smoke, Yellow, M-18
11. Grenade, Hand, Smoke, Green, M-18
12. Grenade, Hand, Smoke, Violet, M-18
13. Kit, Chemical Agent Detector, M-9
14. Kit, First Aid, Gas Casualty
15. Kit, Food Testing, Screening
16. Kit, Ointment, Protective
17. Kit, Poisoned Water, Treatment and Analysis
18. Kit, Treatment, Gas Casualty
19. Kit, Water Testing, Screening
20. Mask, Gas, Headwound, M7-11-9
21. Mask, Gas, Service, M3-10A1-6
22. Mask, Gas, Service, Butyl, MIT
23. Paint, Liquid Vesicant Detector
24. Pot, Smoke, Floating, M4A2
25. RH 195
26. Shell, Smoke, WP, 4.2 Inch CM
27. Shell, Smoke, FS, 4.2 Inch CM
28. Cluster, Bomb, Incendiary, M-12
29. Cluster, Bomb, Incendiary, M-6
30. Napalm
31. CC2
32. Igniter, E3R1
33. Shell, Gas, 105mm, HD
34. Shell, Gas, 105mm, HNI
35. Shell, Gas, 105mm, CG
36. Shell, Gas, 105mm, CK
37. Shell, Gas, 105mm, GA

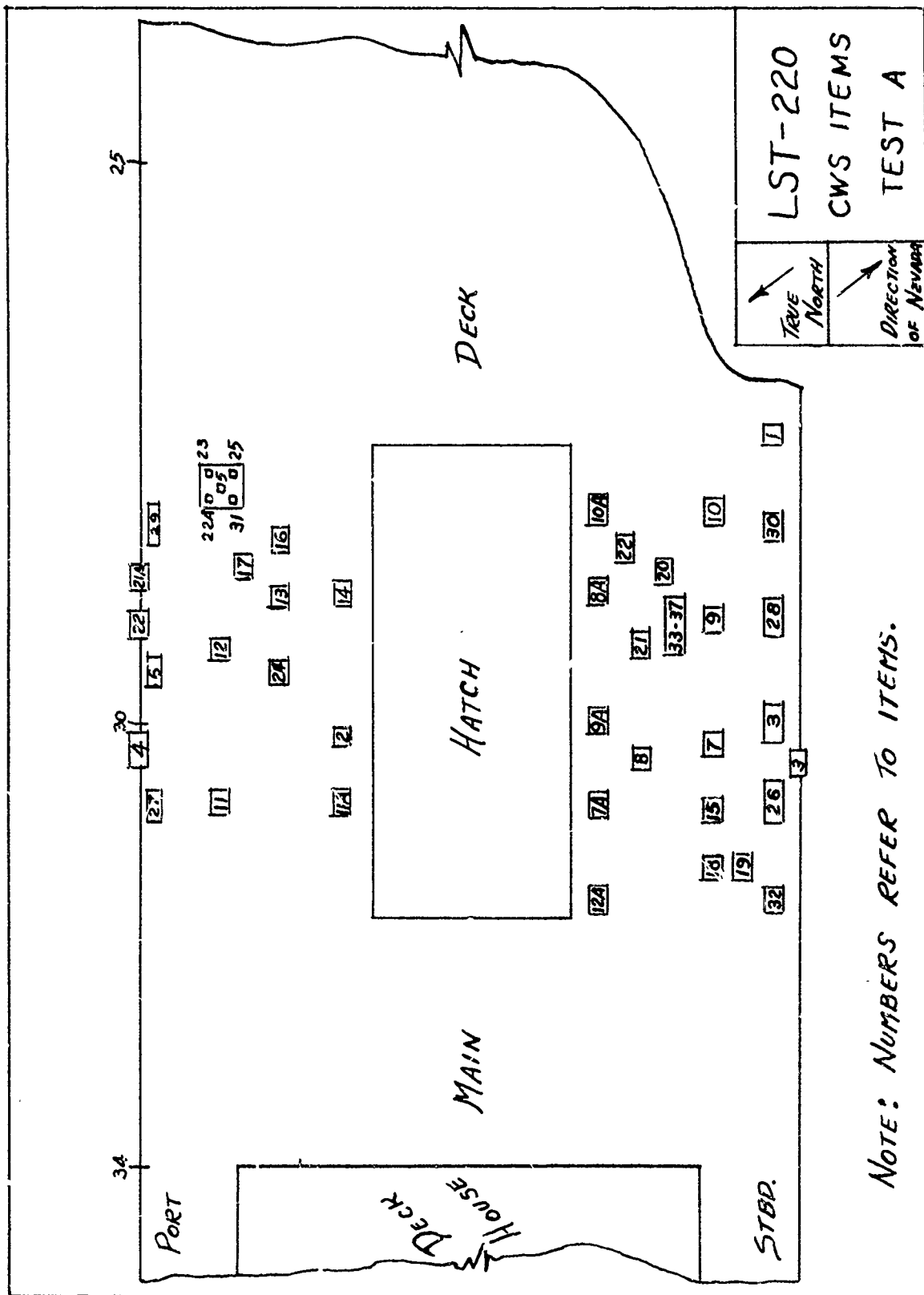
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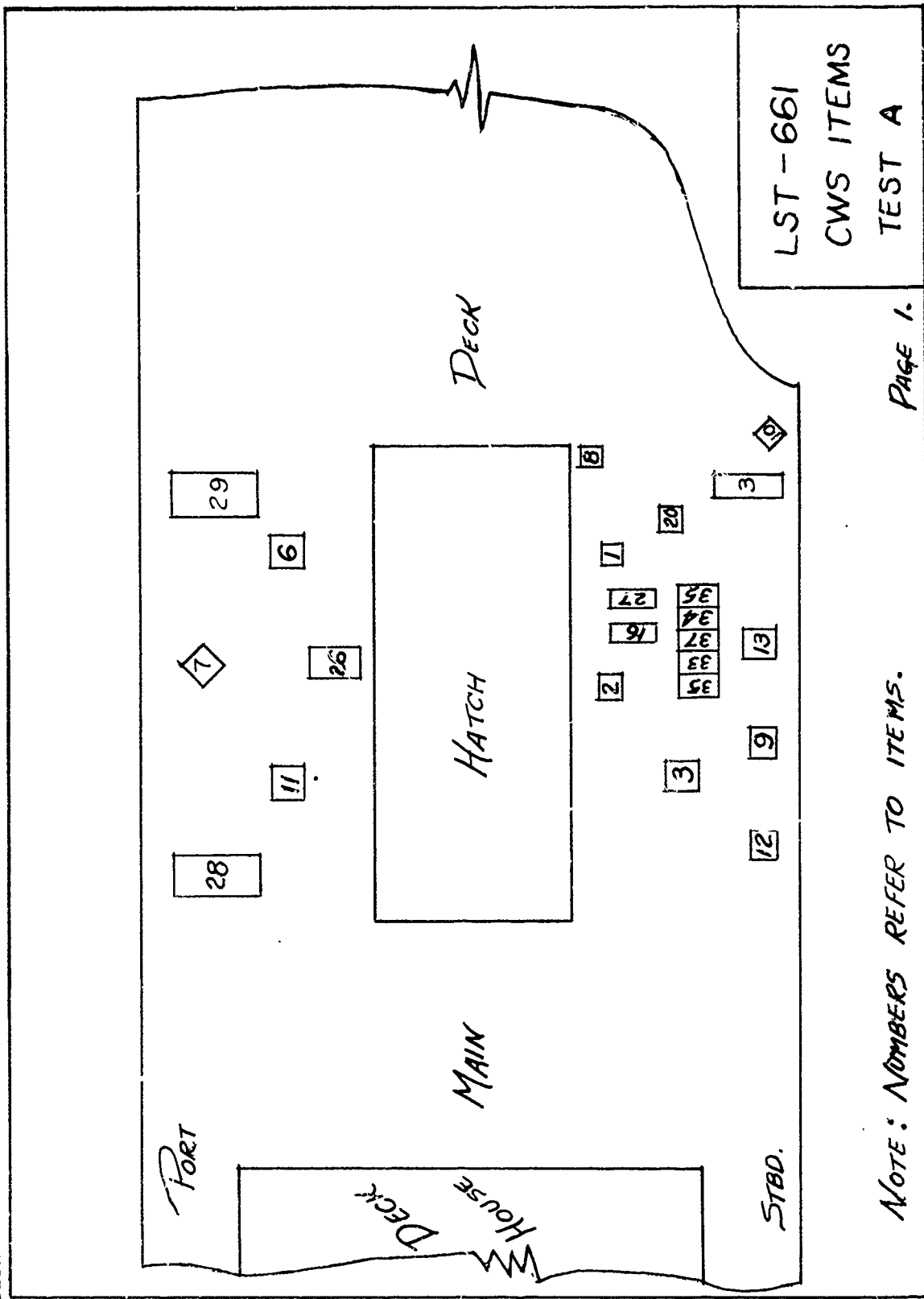
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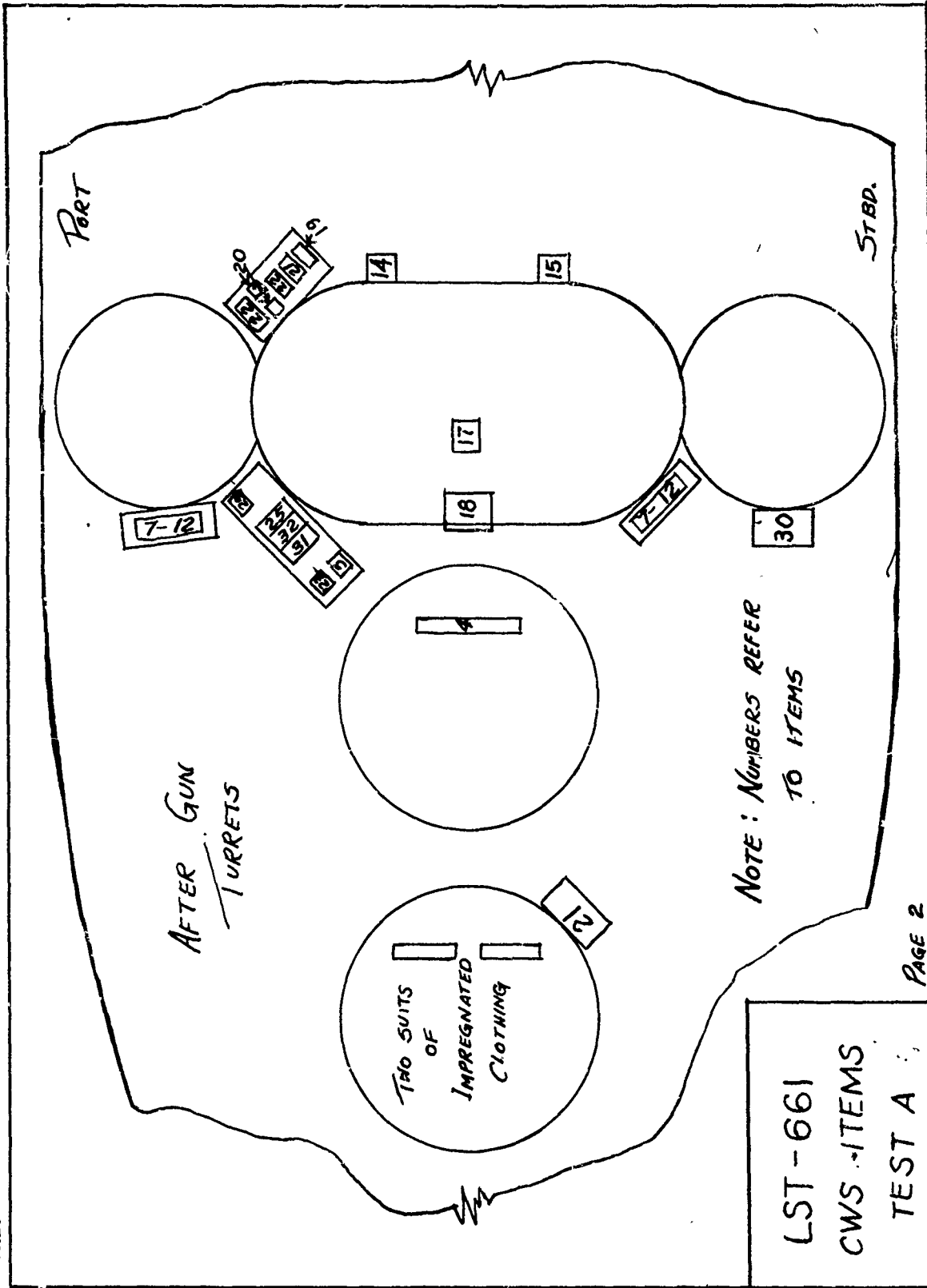


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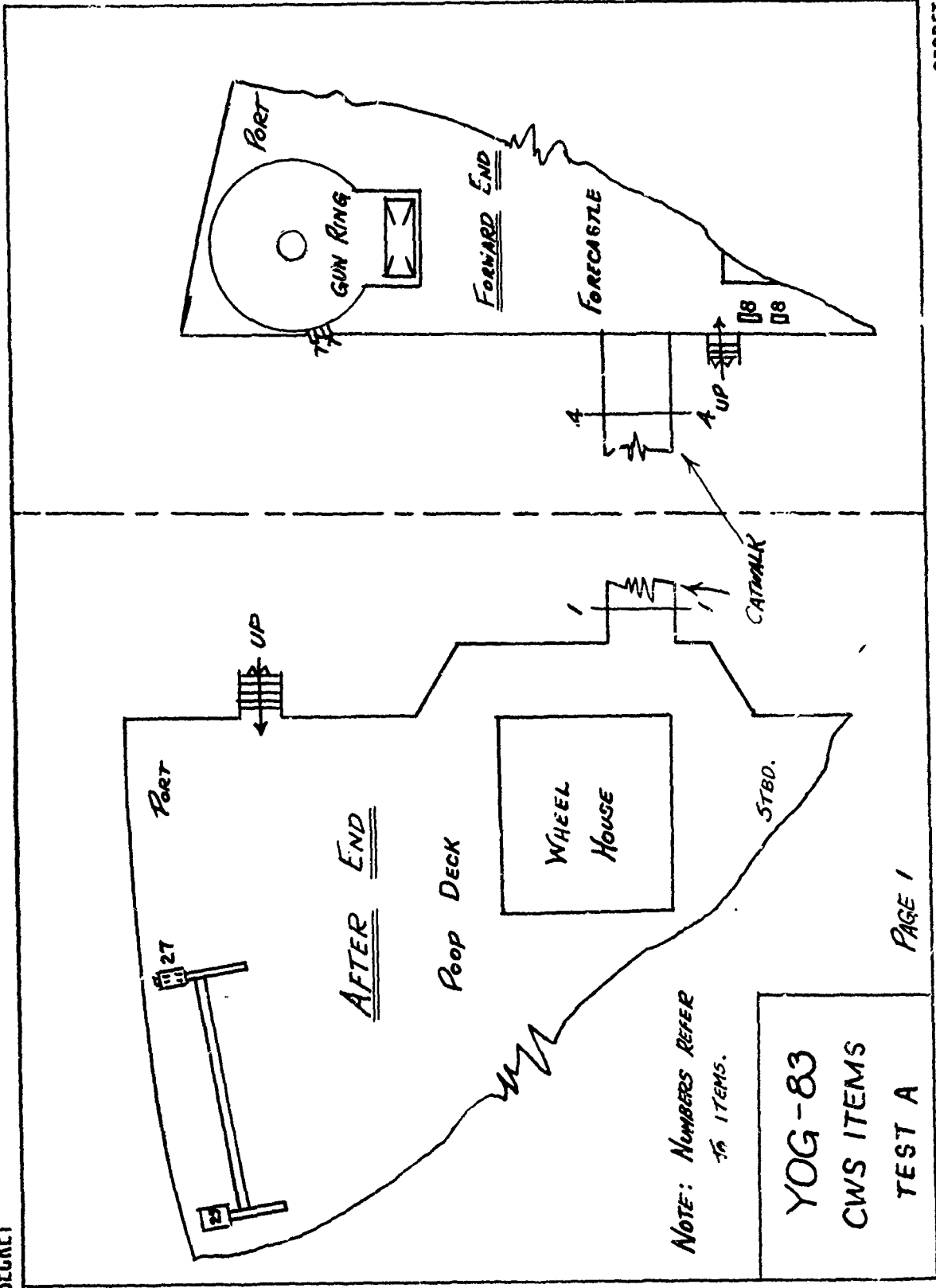


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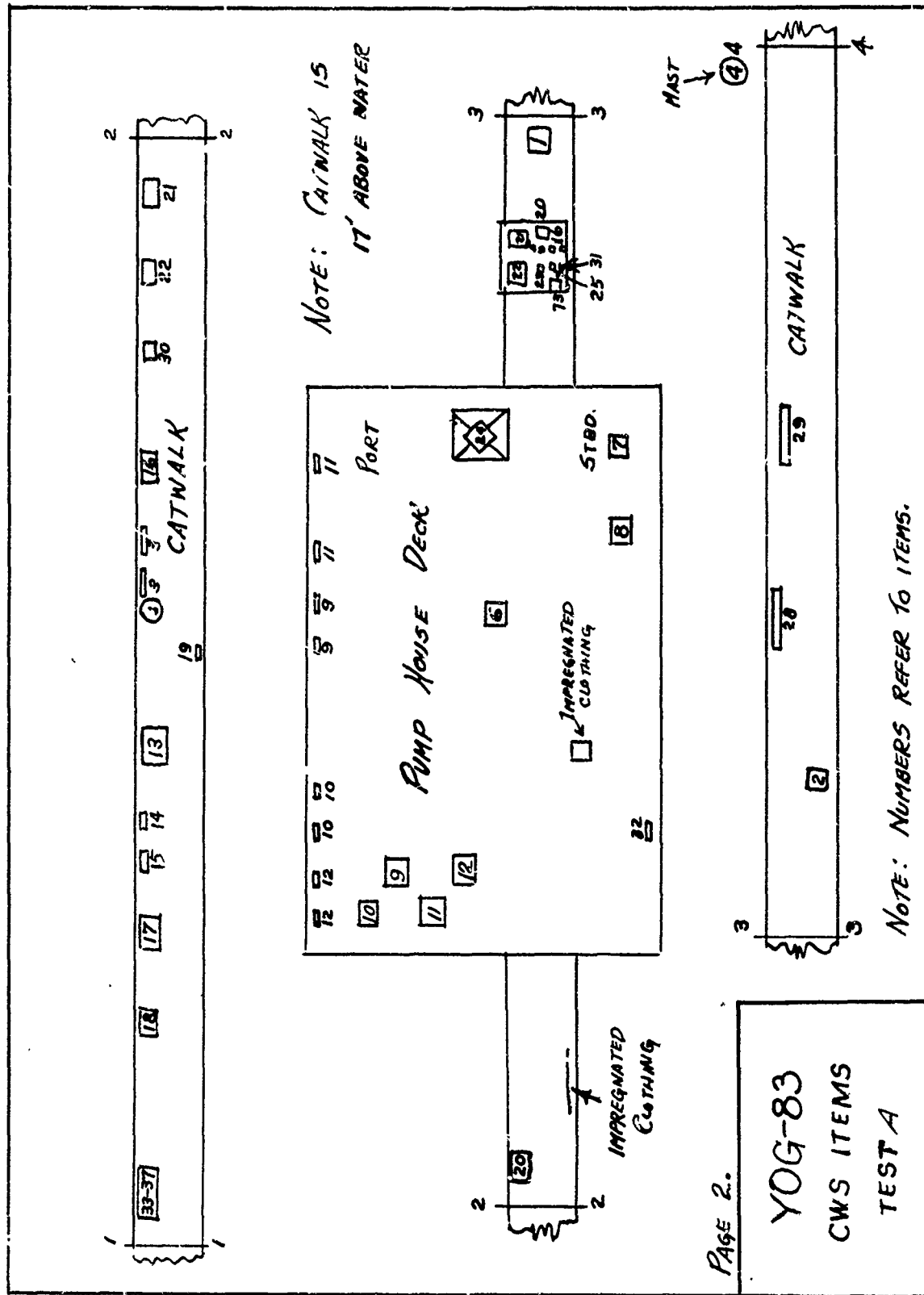
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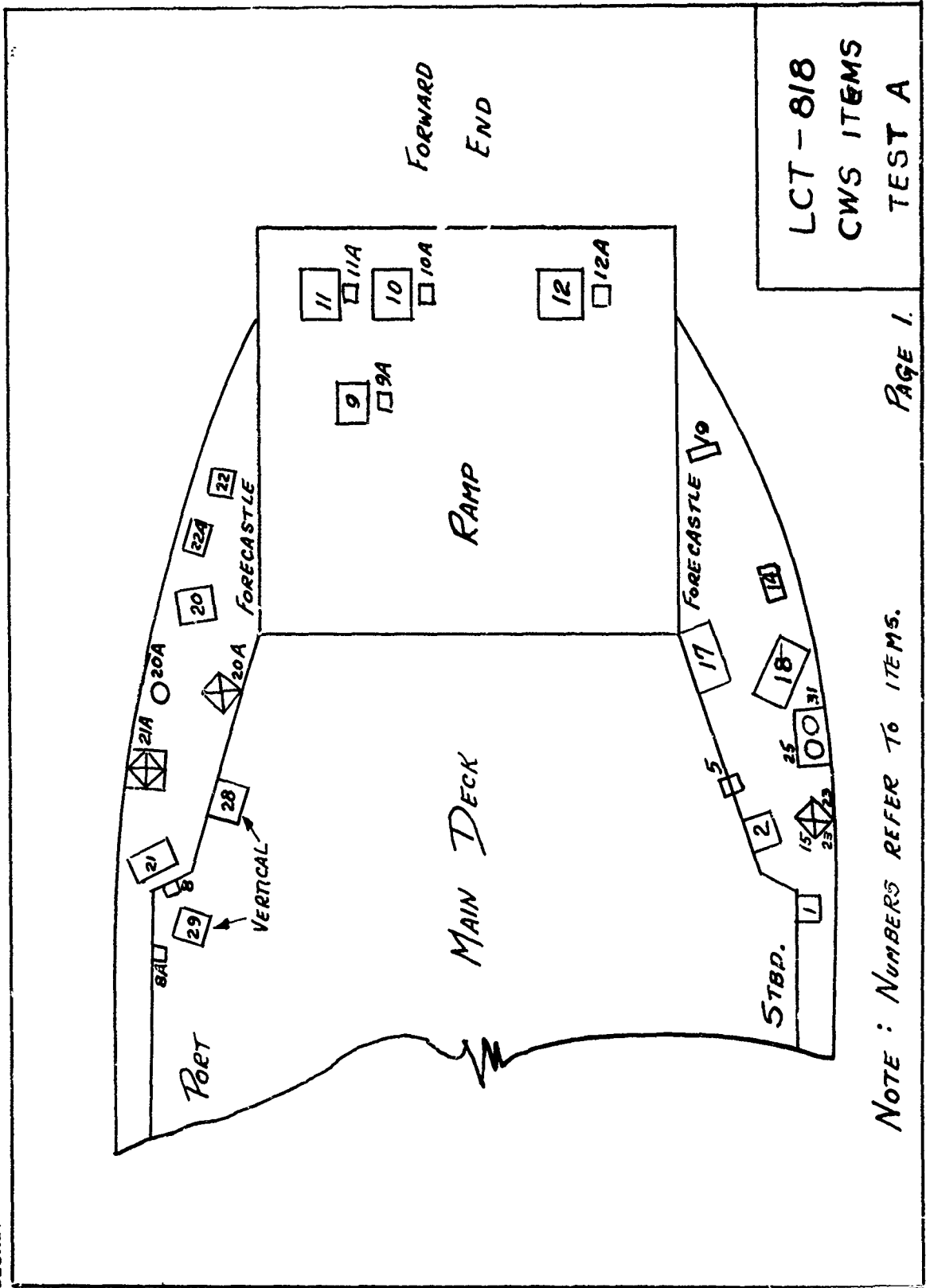
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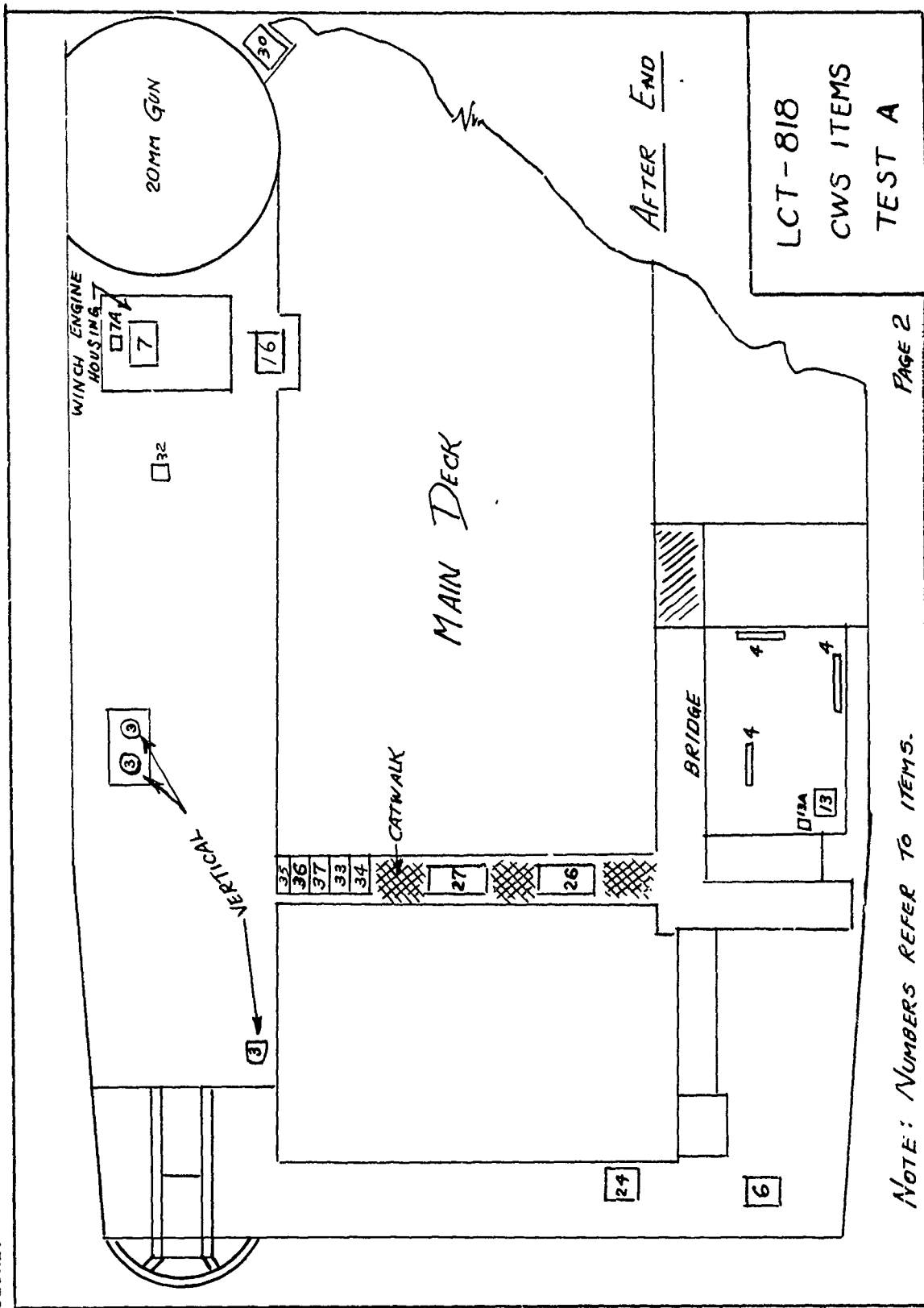
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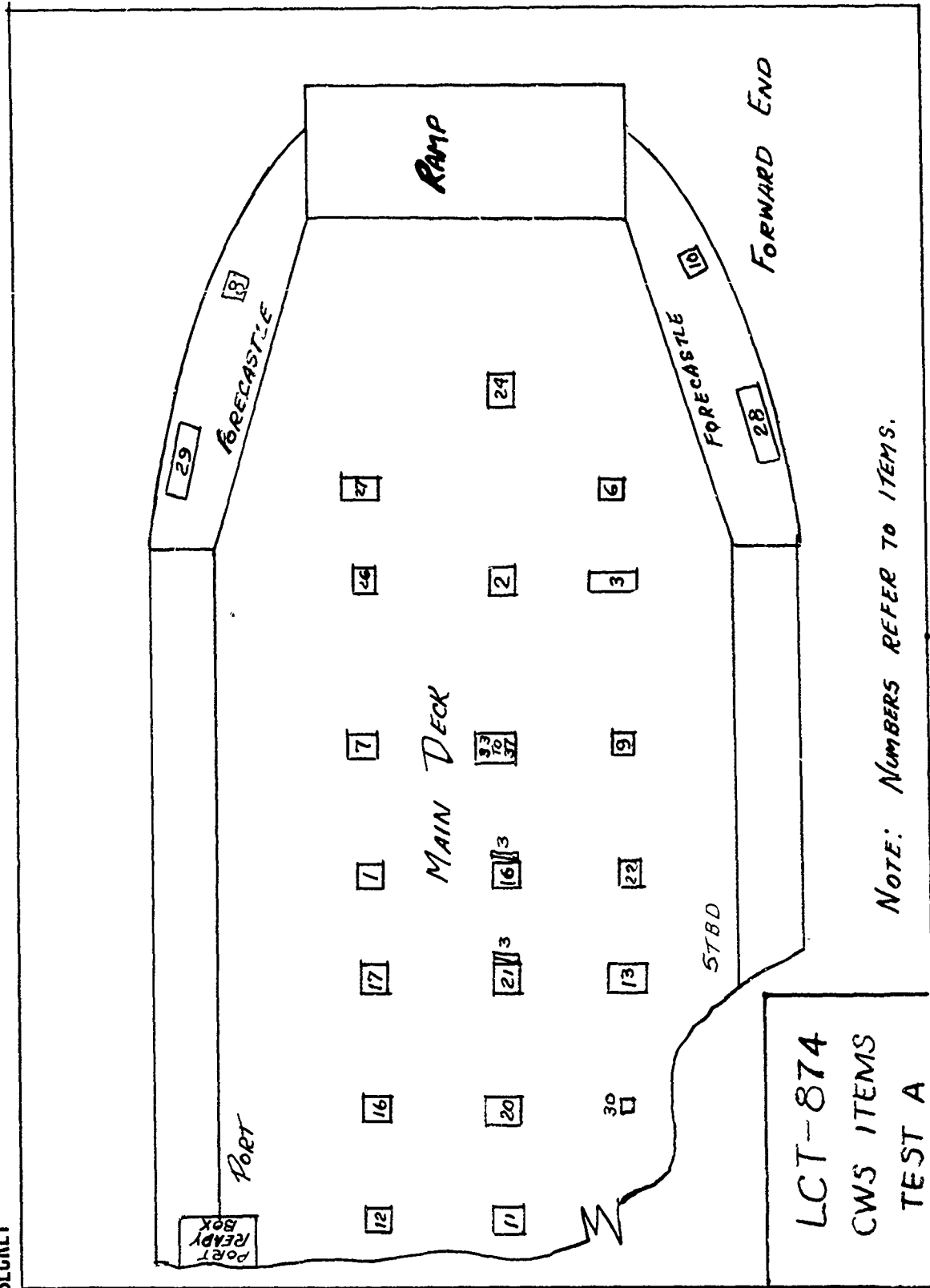
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APPENDIX E

LABORATORY REPORTS

REFERENCE

<u>Ship</u>	<u>CWS No.</u>
YOG-83	Ship #1
LCT-818	Ship #2
LST-52	Ship #3
LCT-874	Ship #4
LST-661	Ship #5
LST-220	Ship #6

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REPORT #1

AGENT, DECONTAMINATING, M4

ITEM 1

EXPOSED "A" DAY

DATE TESTED: 25-39 July 46

Ship #1; DANC container marked DuPont Lot - TM 7, Lot IM - 2
AUG 25 34. The active ingredient, KH 195, and the solvent, acetylene
tetrachloride, was analysed as described in "Crossroads" control
test 1, Item 1.

The values for the moisture, insoluble in chloroform, and acidity
were within the specification limits:

<u>SAMPLE</u>	<u>MOISTURE</u>	<u>INSOL. IN CHCL₃</u>	<u>ACIDITY</u>
1	0.042%	3.60%	0.0002%
2	0.040	3.73	0.0003
3	0.030	3.75	0.0003
AVERAGE	0.037	3.60	0.0003

The values for active chlorine were lower than the minimum
requirements of 35%. A control sample was therefore analysed.

Active Chlorine

<u>SAMPLE</u>	<u>SHIP #1</u>	<u>CONTROL II</u>
1	34.28%	35.67%
2	34.38	35.60
3	34.28	35.60
AVERAGE	34.31	35.65

WORK DONE BY:
PFC D. E. ROSEN
PFC R. K. GALLEY

/s/ JOHN WOTIZ
2nd Lt., CWS

APPROVED:

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #2

BLEACHING MATERIAL, GRADE 3

ITEM 2

EXPOSED "A" DAY

DATE TESTED: 21-29 July 46

Bleaching powder from teams 1, 4, and 6 was tested for particle size as described in "Crossroads" Control Test 1, Item 2. The lot number on each can was illegible. The material of team 1 had a slightly damp appearance, team 4 was very damp, and team 6 was dry. The team 6 can had a built-up pressure. The high retention on screen 40 of containers 1 and 4 is in accordance with their moist appearance.

Team 1

<u>Mesh</u>	<u>Determinations</u>			<u>Average</u>
20	10.0%	9.5%	9.5%	9.8%
20-40	62.0	66.1	65.0	64.4
40-50	28.1	24.8	24.0	25.6
50-60	1.1	1.0	2.2	1.4
60-80	0.5	0.0	0.0	0.2
80-100	0.3	0.0	0.0	0.1
100	0.0	0.0	0.0	0.0

Team 4

20	2.9%	6.0%	7.6%	5.7%
20-40	78.8	80.3	87.3	80.1
40-50	20.9	15.7	10.5	15.7
50-60	5.8	2.0	0.5	2.6
60-80	0.5	0.0	0.0	0.2
80-100	0.1	0.0	0.0	0.0
100	0.0	0.0	0.0	0.0

Team 6

20	4.9%	3.7%	3.0%	3.9%
20-40	33.2	30.0	21.9	28.7
40-50	65.2	65.8	73.8	68.3
50-60	2.0	2.5	3.6	2.7
60-80	0.0	0.0	0.0	0.0
80-100	0.0	0.0	0.0	0.0
100	0.0	0.0	0.0	0.0

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The results compared with the ones of control test 1 show the increase in dampness of the bleaching powder which lumps up on the sieve.

Available chlorine was determined by the standard trituration-arsenite method. The values are below specification standards, but are not significant considering that unexposed samples are also below minimum requirements of 30%.

Free Chlorine

<u>Trial</u>	<u>Team 1</u>	<u>Team 4</u>	<u>Team 6</u>	<u>Control II</u>
1	28.3	26.4	25.8	24.0
2	28.5	26.6	25.8	24.0
3	28.4	26.6	25.8	23.8
Aver.	28.4	26.5	25.8	23.9

The sample for Control II was obtained from container 1811-CWS UT 10. The low value for the control points out only the fact that the amount of free chlorine varies from container to container and no conclusion from the above results can be drawn.

WORK DONE BY:
PFC. F. WALTERS

/s/ JOHN H. WOTIZ
2nd Lt., CWS

/s/ JOAQUIN BORSSELLINO
Capt., CWS

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REPORT #3

CLUSTER, INCENDIARY BOMB, M12

ITEM 28

EXPOSED "A" DAY

DATE TESTED: 29 July 46

1. Description of sample: Two bombs were removed from clusters marked NY 5460-67. Samples were taken from Ships #1 and 6. A control sample was taken from one of the bombs retained at Schofield Barracks during the "A" exposure.

2. Consistency tests were run according to CWS directive 201 A.

3. Results of tests:

<u>Sample:</u>	<u>Ship #1</u>	<u>Ship #6</u>	<u>Control</u>
Gardner Mobility	485	348	610

4. Disposition: Entire sample used up in performance of tests.

/s/ JESSE M BROOKE
2nd Lt., CWS

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #3

CLUSTER, INCENDIARY BOMB, M12

ITEM 28

EXPOSED "A" DAY

DATE TESTED: 29 July 46

1. Description of sample: Two bombs were removed from clusters marked NY 5460-67. Samples were taken from Ships #1 and 6. A control sample was taken from one of the bombs retained at Schofield Barracks during the "A" exposure.

2. Consistency tests were run according to CWS directive 201 A.

3. Results of tests:

<u>Sample:</u>	<u>Ship #1</u>	<u>Ship #6</u>	<u>Control</u>
Gardner Mobility	485	348	610

4. Disposition: Entire sample used up in performance of tests.

/s/ JESSE M BROOKE
2nd Lt., CWS

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #3A

BOMB, CLUSTER, INCENDIARY, M6, & M12

ITEM 28

EXPOSED "A" DAY

DATE TESTED: 31 July 46

Item 28 Cluster, Incendiary Bomb, M12-(69) Lot: NY 5460-67
Ship #1: 8 out 10 functioned on impact.
Ship #6: 9 out of 12 functioned on impact.
Control: 7 out of 9 functioned on impact.

M69 bombs functioned normally, jell held together when ejected unless an obstruction was encountered. No difference between exposed and control sample.

Item 29 Cluster, Incendiary Bomb, M6, Lot: PBA 4001 (M50A2)
Ship #1: 15 out of 21 functioned on impact.
Ship #6: 16 out of 22 functioned on impact.
Control: 10 out of 20 functioned on impact.

Bombs functioned normally. No X (M52A2) bombs, 6 in each cluster, were dropped.

NOTE: The bombs were dropped singly by hand from a 30 ft. cliff onto metal plates and only those were recorded which impacted on the base and which should have functioned. The others together with the X bombs from each cluster were destroyed.

/s/ B. F. SMITH

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REPORT #4

CC 2

ITEM 21

EXPOSED "A" DAY

DATE TESTED: 25-29 July 46, Ships #1, 4 and 6

The agent was analysed as described in "Crossroads", control test 1, item 31.

The values for insolubles in chloroform and chlorides as NaCl were within the specification limits of less than 4.25% and 0.50% by weight respectively.

INSOLUBLES IN CHLOROFORM

<u>Sample</u>	<u>Ship #1</u>	<u>Ship #4</u>	<u>Ship #6</u>
1	3.23	3.22	3.30
2	3.23	3.23	3.24
3	3.27	3.26	3.23
Average	3.23	3.26	3.26

CHLORIDES AS NaCl

1	0.16	0.18	0.16
2	0.17	0.18	0.17
3	0.17	0.17	0.16
Average	0.17	0.18	0.16

The values for moisture were higher than the specification maximum of 0.20%. Control I had a value of 0.26%, a new control sample was therefore analysed.

<u>Sample</u>	<u>Ship #1</u>	<u>Ship #4</u>	<u>Ship #6</u>	<u>Control II</u>
1	0.80	0.83	0.82	0.56
2	0.86	0.92	0.90	0.66
Average	0.83	0.87	0.86	0.61

The values for active chlorine were below minimum specification amount of 14.20%. A control sample was therefore analysed which had a value over the minimum specification amount of 14.65%. (Specification: 14.2 to 14.6)

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ACTIVE CHLORINE

<u>Sample</u>	<u>Ship #1</u>	<u>Ship #4</u>	<u>Ship #6</u>	<u>Control II</u>
1	14.30	14.04	14.14	14.92
2	14.35	14.08	14.19	14.93
3	14.32	14.12	14.20	14.87
Average	14.32	14.08	14.18	14.91

WORK DONE BY:

PFC D. E. ROSEN
PFC R. K. GAILEY
PFC K. D. BAIR

/s/ JOHN WOTIZ
2nd Lt., CWS

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #5

CLOTH, FLAME PROOF

ITEM #4

EXPOSED "A" DAY

DATE TESTED: 26 July 46

1. Description of sample: Stock SE 712EAJ.

I. Ship #1. First layer of a three (3) layer sample. About 50% missing apparently destroyed by heat judging from charred edges.

II. Ship #1. Second layer of a three (3) layer samples; lower one-third (1/3) of sample shows charring.

III. Ship #1. Third layer of a (3) layer sample; sample darkened apparently by staining.

IV. Ship #1. Sample unexposed to weather. Exposed to radiation in a wood box.

V. Ship #2. Edges charred about 90% of sample missing.

VI. Ship #4. Sample showed uneven charring due to uneven exposure. Sample was taken from charred side.

VII. Ship #4. Sample showed uneven charring due to uneven exposure. Sample was taken from charred side.

VIII. Ship #4. Sample exposed to radiation in wooden box.

IX. Ship #5. First layer of a two layer sample; edges charred. About 50% missing.

X. Ship #5. Second layer of a two layer sample. No apparent change.

XI. Ship #6. Sample exposed to weather and radiation.

XII. Ship #6. Sample unexposed to weather. Exposed to radiation in a metal box.

2. Tests were made on a Scott Tensile Strength Apparatus according to ASTM specification D39-39. A two inch wide strip was used, with 2.25 inches between jaws. All results are the average of five tests.

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3. Results:

Sample	I	II	III	IV	V	VI
Tensile Strength AGT WARP, lbs.	276	259	261	271	294	163
Elongation AGT WARP, inches	.29	.30	.20	.20	.35	.20
Tensile Strength AGT WOOF, lbs.	167	148	156	160	166	41
Elongation AGT WOOF, inches	.31	.27	.30	.27	.29	.10

Sample	VII	VIII	IX	X	XI	XII
Tensile Strength AGT WARP, lbs.	281	260	270	265	281	269
Elongation AGT WARP, inches	.30	.22	.30	.26	.20	.21
Tensile Strength AGT WOOF, lbs.	167	136	146	157	154	169
Elongation AGT WOOF, inches	.25	.30	.30	.30	.24	.40

4. Disposition: Retained at Schofield Barracks.

/s/ JESSE M. BROOKE
2nd Lt., CWS
APPROVED:

/s/ JOAQUIN BORSSELLINO
Capt., CWS

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REPORT #6

CLOTHING, IMPREGNATED (COVERALLS)

ITEM: SPECIAL

EXPOSED "A" DAY

DATE TESTED: 27 July 46

1. Description of samples: Stock 55-2-45688. Suit numbers are those assigned in control tests of 1 May 46.

I. Ship #1, suit #2A not exposed to weather. Exposed to radiation in wooden box.

II. Ship #2, suit #7A. Badly charred and shredded. Damp when received.

III. Ship #2, suit #7B. Badly charred and shredded. Damp when received.

IV. Ship #6, suit #8B. Exposed to weather only.

V. Ship #6, suit #8A. Exposed to weather only.

VI. Ship #6, suit #8B. Exposed to weather and radiation.

VII. Ship #6, suit #8A. Exposed to weather and radiation.

VIII. Ship #4, suit #10A. Exposed to weather and radiation. Sample very small unable to get enough for satisfactory tests.

IX. Ship #4, suit #10B. Exposed to weather and radiation. Sample very small, unable to get enough for satisfactory tests.

2. Tensile strength tests were made on a Scott Tensile Strength apparatus according to ASTM specifications D39-39. A two inch wide strip was used with 2.25 inches between jaws. Samples IV, V, VIII, IX are the average of two tests. All others are the average of five tests. Percent impregnation tests were run according to CWS Field Lab Memo 3-2-1, with the following modification; instead of using a ring of material, a rectangle was used.

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3. Results:

Table I

SAMPLE	I	II	III	IV	V
TENSILE STR.WARP lbs.	117	117	80	100	98
ELONGATION WARP, inch	.25	.30	.21	.30	.21
TENSILE STR.WARP, lbs.	92	108	82	82	119
ELONGATION WOOF, inch	.11	.22	.19	.20	.21
CC ₂	6.13	3.68	5.00	3.12	4.65

SAMPLE	VI	VII	VIII	IX
TENSILE STR.WARP lbs.	66	83	20	26
ELONGATION WARP, inch	.15	.21	.10	.10
TENSILE STR.WARP, lbs.	57	84	115	45
ELONGATION WOOF, inch	.16	.12	.10	.10
CC ₂	3.05	4.23	2.88	2.71

4. Disposition: Retained at Schofield Barracks.

/s/ JESSE M BROOKE
2nd Lt., CWS

APPROVED

/s/ JOAQUIN BORSELLINO
Capt., CWS

Analysis of Report:

Lowered figures appearing in Table I are commensurate with prolonged exposure to weather.

H.C.A

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REPORT #7

CRAYON, VESICANT DETECTOR, M7

ITEM 5

EXPOSED "A" DAY

DATE TESTED: 24 Jul to 5 Aug 46

1. Immediate tests: U S Army Spec. No. 97-54-212A, 13 Aug 45

Color:

All crayon tested had the following color as compared with the Munsell System Color Chart:

Hue - - 5.0 R

Value - 6

Chroma- 8

The details and results are presented in Table I

Application:

No Glazing was evident in any of the tested samples. The samples from Ships #5 and #6 crumbled slightly.

Sensitivity:

Comparison with the Munsell Chart after following the procedure outlined in paragraph F-4d of the specifications showed the following results:

Hue - - 5.0 PB

Value - 5

The detailed results are shown in Table I

2. Stability at 65° C

Color:

Detailed results of the color comparison after storage for two weeks at 65° C are shown in Table II. Samples from ships #2, #5, and #6 show increasing change with the increase in distance from the bomb burst.

Application:

The results of observations on the glazing and crumbling of samples stored at 65° C are presented below:

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<u>Sample</u>	<u>Glazing</u>	<u>Crumbling</u>
Control	None	None
Ship #1	None	None
Ship #2	Slight	None
Ship #5	None	Slight
Ship #6	None	None

From the above observations it appears that glazing and crumbling were not related to exposure, but depended on the individual sample chosen for testing.

Sensitivity:

Samples from Ships #2, #5, and #6 appear unstable although the ship #1 sample was apparently unaffected. The detailed results appear in Table II. It should be noted that samples 2, 5, and 6 were the same color as the marks they produced on paper.

3. Condition of Packages:

The only change in the inside packaging was a tendency of the wax to stick to both the inside carton and the outside paper wrapper. This slight melting of the wax may have been caused by the heat from the sun during the weathering period before and after the exposure to the effects of the atomic bomb.

The outside paper wrapper on the two samples nearest the bomb blast was scorched on the top, edges, and sides toward the explosion. All showed the effects of weathering on the outside wrappers.

4. From these results it can be seen that the crayon affected most was at the greatest distance from the target ship.

WORK DONE BY:
PFC R. GAILEY

/s/ N R MARTIN
2d Lt., CWS

APPROVED:

/s/ CHRIS L MENGIS
2d Lt., CWS

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TABLE I

Color Test	: Specs.	: Control:	: # 1	: # 2	: # 5	: # 6
Before exposure	:	:	:	:	:	:
to n-butyl sulfide:	:	:	:	:	:	:
HUE - - - - -	: Not	: 5.0 R	: 5.0 R	: 5.0 R	: 5.0 R	: 5.0 R
	: yellower:	:	:	:	:	:
	: than :	:	:	:	:	:
	: 5.0 R :	:	:	:	:	:
	: Not :	:	:	:	:	:
	: bluer :	:	:	:	:	:
	: than :	:	:	:	:	:
	: 10.0 R :	:	:	:	:	:
	:	:	:	:	:	:
VALUE - - - -	: Between :	:	:	:	:	:
	: 5 & 6 :	: 6	: 6	: 6	: 6	: 6
	:	:	:	:	:	:
CHROMA - - - -	: Not less:	:	:	:	:	:
	: than 6 :	: 8	: 8	: 8	: 8	: 8
	:	:	:	:	:	:
After exposure	:	:	:	:	:	:
to n-butyl sulfide:	:	:	:	:	:	:
HUE - - - - -	: Not	: 5.0 PB	: 5.0 PB	: 5.0 PB	: 5.0 PB	: 5.0 PB
	: greener :	:	:	:	:	:
	: than :	:	:	:	:	:
	: 10 B :	:	:	:	:	:
	: Not :	:	:	:	:	:
	: redder :	:	:	:	:	:
	: than :	:	:	:	:	:
	: 5.0 PB :	:	:	:	:	:
VALUE - - - -	: Not	: 5	: 5	: 5	: 5	: 5
	: greater :	:	:	:	:	:
	: than 5 :	:	:	:	:	:
	:	:	:	:	:	:

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STABILITY AT 65° C

TABLE II

Color Test	: Specs.	: Control	: # 1	: # 2	: # 5	: # 6
Before exposure	:	:	:	:	:	:
to n-butyl sulfide:	:	:	:	:	:	:
HUE - - - - -	: Not	: 2.5 R	: 2.5 R	: 2.5 R	: 5.0 R	: 7.5 YR
	: yellower:	:	:	:	:	:
	: than	:	:	:	:	:
	: 5.0 R	:	:	:	:	:
	: Not	:	:	:	:	:
	: bluer	:	:	:	:	:
	: than	:	:	:	:	:
	: 10.0 R	:	:	:	:	:
VALUE - - - - -	: Between	: 6	: 6	: 6	: 7	: 8
	: 5 & 6	:	:	:	:	:
CHROMA - - - - -	: Not less	: 10	: 10	: 4	: 2	: 4
	: than 6	:	:	:	:	:
	:	:	:	:	:	:
After exposure	:	:	:	:	:	:
to n-butyl sulfide:	:	:	:	:	:	:
HUE - - - - -	: Not	: 5.0 PB	: 5.0 PB	: Scarcely Perceptible	:	:
	: greener	:	:	: mark by paper strip	:	:
	: than	:	:	:	:	:
	: 10.0 B	:	:	:	:	:
	: Not	:	:	:	:	:
	: redder	:	:	:	:	:
	: than	:	:	:	:	:
	: 5.0 PB	:	:	:	:	:
VALUE - - - - -	: Not	: 5	: 5	: Scarcely Perceptible	:	:
	: greater	:	:	: mark by paper strip	:	:
	: than 5	:	:	:	:	:

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REPORT #8

CYLINDER, IGNITION, PFT
GRENADE, HAND, SMOKE, WP
GRENADE, INCENDIARY, AN-M14
GRENADE, SMOKE, M18, RED
GRENADE, SMOKE, M18, YELLOW
GRENADE, SMOKE, M18, GREEN
GRENADE, SMOKE, M18, VIOLET
IGNITER, E3R1

ITEMS 6-12, 32

EXPOSED: "A" DAY
DATE TESTED: 25 July 1946

Item 6

Cylinder, Ignition, PFT. Lot No. NY5574-247. Six (6) ea. cylinders from ships 1, 4 and 6 were tested in PFT gun - all functioned normally burning 10 sec. plus or minus 1 sec. except one from ship 6 that burned for 2 sec. only.

Item 7

Grenade, Hand, Smoke, WP. Lot 13960. Five each from ships 1, 4 and 6 were burst. All functioned normally.

Item 8

Grenade, Incendiary, AN-M14. Lot HA 318-17. Five each from ships 1, 4 and 6 functioned normally.

Ship 1, burning time - 27, 34, 28, 28, and 34 seconds.

Ship 4, burning time - 36, 36, 29, 32, and 39 seconds.

Ship 6, burning time - 20, 33, 32, 25, and 15 seconds.

Control, (Depot) burning time - 37, 31, 38, 31, 36, and 33 sec.

Item 9

Grenade, Smoke, M18, Red. Lot 216-37. Five each from ships 1 and 6 were burned with normal functioning.

Ship 1, burning time - 65, 60, 64, 85 and 90 seconds.

Ship 6, burning time - 69, 75, 77, 95 and 96 seconds.

Control, (Depot) burning time - 70 and 120 seconds (this one started very slowly).

Item 10

Grenade, Smoke, M18, Yellow. Lot 304-15. Five each from ships 1, 4 and 6 functioned normally.

Ship 1 - burning time - 50, 54, 61, 45, and 55 seconds.

Ship 4 - burning time - 42, 43, 44, 50, and 70 seconds.

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Ship 6 - burning time - 45, 47, 50, 55, and 56 seconds.
Control (Depot) burning time - 68, 50, and 43 seconds.

Item 11

Grenade, Smoke, M18, Green. Lot 218-38. Five each from ships 1, 4, and 6 were burned and functioned normally.

Ship 1 - burning time - 57, 62, 63, 67, and 80 seconds.

Ship 4 - burning time - 51, 58, 59, 62, and 68 seconds.

Ship 6 - burning time - 50, 60, 65, 66, and 78 seconds.

Control (Depot) burning time - 63, 54, and 62 seconds.

Item 12

Grenade, Smoke, M18, Violet. Lot 173-49. Five each from ships 1, 4, and 6 were functioned. Results were normal.

Ship 1 - burning time - 60, 65, 68, 85, and 90 seconds.

Ship 4 - burning time - 52, 55, 56, 82, and 120 seconds.

Ship 6 - burning time - 60, 65, 70, 80, and 85 seconds.

Control (Depot) burning time - 65, 55, and 95 seconds.

Item 32

Igniter, M3R1

The igniters exposed on ships 1, 4, and 6 together with a control were functioned. All burst normally.

Remarks:

Controls which had been stored at building #2281, CW Depot, were burned at the same time as the exposed items and both were carefully observed for any difference in functioning, color of smoke, starting period, etc. No differences were observed between the items exposed during the "A" Test and the control items. All items were exposed in boxes packed for overseas shipment. Packages were all in good shape; the one from ship #1 was slightly charred.

/s/ B. F. SMITH

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REPORT #8A

GRENADA, HAND, SMOKE, WP
GRENADA, INCENDIARY, AN-M14
GRENADA, SMOKE, M18, RED
GRENADA, SMOKE, M18, YELLOW
GRENADA, SMOKE, M18, GREEN
GRENADA, SMOKE, M18, VIOLET

ITEMS 7a, 8a, 9a, 10a, 11a, and 12a
(Individual Exposure)

EXPOSED: "A" DAY
DATE TESTED: 25 July 1946

Item 7a

Grenade, Hand, Smoke, WP. Lot 139-60. Ships 1, 4, and 6.
Two each were exposed. All functioned normally.

Item 8a

Grenade, Incendiary, AN-M14. Lot HA 318-17
Ship 1 - burning time - 16 and 34 seconds.
Ship 4 - burning time - 28 and 35 seconds.
Ship 6 - burning time - 25 and 26 seconds.

Item 9a

Grenade, Smoke, M18, Red. Lot 216-37
Ship 1 - burning time - 60 and 110 seconds.
Ship 4 - burning time - 85 and 70 seconds.
Ship 6 - burning time - 60 and 80 seconds.
Control burning time - 75, 60, 85, 58, 64, 65, 75, 90,
and 130 seconds.

Item 10a

Grenade, Smoke, M18, Yellow. Lot 304-15
Ship 1 - burning time - 45 and 55 seconds.
Ship 4 - burning time - 40 and 44 seconds.
Ship 6 - burning time - 48 seconds and fuze failure.
Control burning time - 46, 52, 48, 55, 45, 51, seconds and
fuze failure.

Item 11a

Grenade, Smoke, M18, Green. Lot 218-38
Ship 1 - burning time - 60 and 63 seconds.
Ship 4 - burning time - 54 and 56 seconds.
Ship 6 - burning time - 60 and 65 seconds.
Control burning time - 60, 65, 59, 60, 61, 64, 66, and 75 sec.

Item 12a

Grenade, Smoke, M18, Violet. Lot 173-49
Ship 1 - burning time - 62 and 64 seconds.

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Ship 4 - burning time - 61 and 64 seconds.

Ship 6 - burning time - 57 and 68 seconds.

Control burning time - 90, 60, 95, 55, 60, 62, 90, and 130 seconds.

Note:

Control colored smoke grenades burned with the exposed grenades to check the color and functioning. All functioned normally and the color of the smoke from the control and exposed grenades was the same.

/s/ E. F. SMITH

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REPORT #9

KIT, CHEMICAL AGENT, DETECTOR, M9

ITEM 13

EXPOSED: "A" Day

DATE TESTED: 26 July 1946

Ship #1: Item 13

1. Description of sample: Overseas package, one kit chosen at random from CWS Stock No. 564910, Lot No. C-CWS 312-7A.

2. On inspection the cardboard container and carrying case were in good condition. The pump and flashlight were in working order. The red and green reagent bottles were cracked leaving liquid stains on inside of kits. A test was made on CG and proved satisfactory.

3. Conclusion: The kit is in good condition and is satisfactory for testing purposes.

4. Disposition: Retained at Schofield Barracks.

Ship #1: Item 13A

1. Description of sample: Kit tested as recieved. CWS Stock No. 564910, Lot No. C-CWS 312-3.

2. On inspection top of kit was found to be weatherbeaten with signs of slight scorching. The pump was in good working condition. The flashlight battery had a slight acid leak but performed satisfactorily. A test was made on CG and proved satisfactory.

3. Conclusion: The kit is in fair condition and is satisfactory for testing purposes.

4. Disposition: Retained at Schofield Barracks.

Ship #4: Item 13

1. Description of sample: One kit chosen at random from CWS Stock No. 564910, Lot No. C-CWS 312-6. Waterproof wrapping had been removed from case prior to exposure.

2. On inspection the cardboard case showed considerable water damage. The metal parts of the carrying case were corroded. The

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fabric had shrunk slightly making it very difficult to remove the reagent bottles. The paint was coming off the reagent bottles and the rubber bulbs were rotted and cracked. The pump performed satisfactorily but was mildewed and the metal parts rusted. The zinc of the battery was completely eaten away. The test was made on CG and proved satisfactory.

3. Conclusion: In spite of considerable superficial damage, the kit can be used satisfactorily for test purposes. Damage seemed due to salt water rather than radiation, heat or blast.

4. Disposition: Retained at Schofield Barracks.

Ship #4. Item 13A

1. Description of sample: Kit was tested as recieved. CWS stock No. 564910, CWS Lot No. C-CWS 312-6.

2. On inspection the carrying case showed signs of being weather-beaten only. The pump and flashlight were in good working condition. The rubber bulb was flat on the blue reagent bottle. A test was made on CG and proved satisfactory.

3. Conclusion: This kit was in fair condition and is satisfactory for testing purposes.

4. Disposition: Retained at Schofield Barracks.

Ship #6. Item 13

1. Description of sample: One kit was chosen at random from overseas package, CWS Stock No. 564910 Lot No. C-CWS 312-7.

2. On inspection, the cardboard container and carrying case were in good condition. The pump was in good working order. The flashlight and battery had the zinc case almost entirely corroded away. A test was made on CG and proved satisfactory.

3. Conclusion: This kit is in good condition and is satisfactory for testing purposes.

4. Disposition: Retained at Schofield Barracks.

Ship #8 Item 13A

1. Description of sample: Kit was tested as recieved. CWS Stock No. 564910, Lot No. C-CWS 312-3.

2. On inspection the carrying case was in good condition. The pump was in good working order. The flashlight performed satisfactorily with another battery. The rubber bulbs of the reagent bottles were cracked. A test was made with CG and proved satisfactory for

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for testing purposes.

4. Disposition: Retained at Schofield Barracks.

Control Sample:

1. Description of sample: One kit was chosen at random from overseas package, CWS Stock No. 564910, Lot No. C-CWS 312-3. This case remained at Schofield Barracks during the atom bomb tests.

2. On inspection the cardboard container and carrying case were in good condition. The pump and flashlight were in good working order. The flashlight and battery were slightly corroded. A test was made on CG and proved satisfactory.

3. Conclusion: This kit is in good condition and is satisfactory for testing purposes.

4. Disposition: Retained at Schofield Barracks.

/s/ JESSE M BROOKE
2nd Lt., CWS

APPROVED

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #10

KIT, FIRST AID, GAS CASUALTY:

Item 14

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and Chemical Description of Kit, First Aid, Gas Casualty:

1. Number on Kit: 12854
2. Ship: YOG-83

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents:

1. Inside of package: paint blistered and rusted.
2. Instruction sheet: moistened by seepage of M4 and BAL Ointments.
3. Cotton pads: carton and pads moistened, labeling legible.
4. Chloroform: carton moistened, labeling legible, bottle cap rusted, seal on bottle cap intact.
5. Copper Sulfate Solution: carton moistened, labeling illegible, forceps rusted, label on bottle moistened but legible.
6. Eye and Nose Drops: carton moistened, label legible, bottle 3/4 full, label moistened.
7. Eye Solution: carton moistened, labeling legible.
8. Amyl Nitrite: carton moistened, two (2) ampules broken.
9. Calamine Lotion: carton moistened, labeling illegible, label on bottle illegible.
10. M4 Ointment: tube decomposed, contents leaked out.
11. BAL Ointment: paint blistered on tubes (2), labeling illegible, one tube partially decomposed.
No chemical decomposition.

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Comment:

Damage to Kit due to seepage of M4 and BAL Ointments., and not due to the presence of heat.

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REPORT #10A

KIT, FIRST AID, GAS CASUALTY:

Item #14

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and Chemical Description of Kit, First Aid, Gas Casualty:

1. Number on Kit: 12947
2. Markings on bottom of Kit: 15 T EXP
3. Ship: LCT 874

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents:

1. Inside of package: Paint blistered and rusted around right inside edge of box.
2. Amyl Nitrite: One ampule broken, carton moistened, label legible.
3. M4 Ointment: Tube discolored, markings legible. Chemical decomposition.
4. BAL Ointment: Tubes (2) slightly discolored, some seepage of ointment. No chemical decomposition.

Comment:

Damage in kit evidently due to the presence of M4 and BAL Ointments and not due to presence of heat.

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REPORT #10B

KIT, FIRST AID, GAS CASUALTY:

Item #14

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and Chemical Description of Kit, First Aid, Gas Casualty:

1. Number on Kit: 12963

2. Ship: LST 661

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents:

1. Inside of package: Instruction sheet on inside of top stained by seepage of BAL and M4
2. Amyl Nitrite: Carton moistened by seepage of M4 Ointment and BAL.
3. M4 Ointment: Contents leaking, tube shows some evidence of heat: markings on tube legible. Chemical decomposition.
4. BAL Ointments: Paint on tubes blistered, contents leaked out. Chemical analysis: No decomposition.

Comment:

Although there was no full description of the contents of the package before exposure, damage evidently due to the presence of M4 and BAL and not due to presence of heat.

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REPORT #10C

KIT, FIRST AID, GAS, CASUALTY:

Item #14

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and Chemical Description of Kit, First Aid, Gas Casualty:

1. Item number: 14; Lot number: 9776400; Ship: LST 220
2. Ship position: 3200 yds. N. of Nevada B-54.
Ship orientation: ESE to WNW.
3. Description of placement: horizontal.
Inspected by: B. F. Smith, 27 June, 1946
 - a. Position: on beam over hatch.
 - b. Method of securing: strapped to I beam.
 - c. Exposure toward target: full-end toward Nevada.
4. Inspection after exposure: by B. F. Smith, 2 July 1946, 1600.
 - a. Exposure to blast: full.
 - b. Condition of package: perfect.
 - c. Remarks: no evidence of heat or blast. (Red blot on side exposed toward blast, on all items)

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents.

1. Inside of package: paint blistered and rusted underneath.
2. Instruction sheet: printing illegible on left hand side, moistened with contents of tubes containing M4 and BAL Ointments.
3. M4 Ointment: Tube decomposed: contents leaked out.
4. BAL Ointment: Tubes (2) decomposed: contents leaked out.
5. Calamine Ointment: Carton moistened: label legible.
6. Chloroform: Carton moistened: label legible.
7. Cotton Pads: Carton moistened: label legible.
cotton moistened.

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- 8. Amyl Nitrite: Two ampules broken.
- 9. Eye and Nose Solution: Label illegible.
- 10. Eye Solution: Carton moistened; label legible.
- 11. Copper Sulfate Solution: Forceps rusted; contents: bottle empty.

General description of item:

Contents and paint inside container contaminated by seepage from tubes containing M4 and BAL Ointments.

Comments:

Damage to Kit due to the destruction of M4 and BAL Ointments.
No visible evidence of heat decomposition. Destruction evidently due to contents of BAL and M4 Ointments.

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REPORT #10D

KIT, FIRST AID, GAS CASUALTY:

Item #14

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and Chemical Description of Kit, First Aid, Gas Casualty:

1. Item number: 14; lot number: 9776400; ship LCT 818.
2. Ship position: Berth 164; ship orientation: Bow 75° east.
3. Description of package: 1 each metal container, 9 x 5 x 3.
4. Inspected by: Wotiz, June 7, 1946.
 - a. Position: top of 10th chock, starboard forecastle.
 - b. Method of securing: strapped
 - c. Exposure toward target: 100%
5. Inspection after exposure: by Wotiz, July 4, 1946
 - a. Exposure to blast: 100%
 - b. Condition of package: no visible change.

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents:

1. Inside of package: Instruction sheet contaminated with contents of BAL and M4 Ointment tubes. Printing illegible on top right hand side. Paint on inside of top blistered, with rust forming beneath.
2. M4 Ointment: Tube empty of contents. Paint on tube decomposed. Printing illegible.
3. BAL Ointment: 2 tubes. Contents intact assayed. Printing on tubes illegible. No chemical decomposition.
4. Calamine Lotian: Carton moistened with contents of BAL and M4 Ointment tubes. Label legible. Bottle and contents normal. Label on bottle illegible.

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5. Chloroform: Carton moistened with contents of BAL and M4 Ointment tubes. Contents of bottle intact. Label on bottles illegible.
6. Cotton Pads: Carton moistened. Cotton contaminated with liquid from M4 and BAL tubes.
7. Amyl Nitrite: Carton moistened; two ampules broken.
8. Eye and Nose Drops: Label illegible; carton moistened.
9. Eye Solution: Carton moistened; label legible.
10. Copper Sulfate Solution: Forceps rusted; bottle empty of contents. No evidence of leakage.
11. Paint inside bottom of container blistered and rusted underneath.

General description of item:

Contents and paint inside container contaminated by M4 Ointment and seepage from BAL Ointment tubes.

Comment:

Kit usable in most emergencies but use difficult because of obliterated instructions. M4 Ointment and copper sulfate solution not usable. Although there was no detailed description of the contents prior to the blast by Wotiz, it is believed that most of the damage in the package was due to the solvent action of the contents of the BAL and M4 Ointments and not due to the effects of heat. Evidence of the copper sulfate solution leaking was not available suggesting that the bottle was not full at packaging.

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REPORT #11

KIT, FOOD TESTING, SCREENING:

Item #15

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical Examination

No. 12854 case was badly warped and pitted. The only changes noted in these kits were some evaporation of solution "C" and some deterioration of the Mustards Test Papers as evidenced by slightly yellow coloration of the papers and/or the appearance of a blue color when blank tests were made. This deterioration may be due to storage of the kits at temperatures high enough to cause vapors of solution "C" to escape into the kit, contaminating the Mustards Test Papers. Whether such temperatures were the result of storage or due to exposure cannot be determined without more detailed information on the treatment given the kits. There are no striking variations among the contents or test performances of the five kits.

YOG - 83

Markings on Kit - 12854--white 15 on back right. Long white 1 on right end. White dot on front left.

Physical Condition of Kit - Adhesive disintegrated. Front--top and left end of kit so badly pitted that labeling is illegible. Kit out of shape, plastic has bubbles. Deep indentation from wires. Kit top warped. Clamp off. Socket missing.

Chemical Tests

Mustard Test Papers*

Mustard - CK - Vial A--slight yellow streak along front of vial. Vial B, Bottle A and B O.K. Papers--sl. yellow at ends. Test--Satisfactory. Blank--O.K.

Arsenical Test Papers* - Bottle C--7/8 full. Papers--O.K. in appearance. Test--Satisfactory.

Detector Crayon - Pad-sealed Butvar packet had hole in side of packet--several sheets discolored on edge. Crayon--O.K. Test--Satisfactory.

LCT - 874

Markings on Kit - 12947--no other marking.

Physical Condition of Kit - Clamp out of socket at one end. Adhesive--O.K.

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Chemical Tests

Mustard Test Papers*

Mustard - CK - Vial A--O.K. Vial B--slightly moist.
Bottles A and B--O.K. Papers--O.K.
Test--Satisfactory. Blank--O.K.

Arsenical Test Papers* - Bottle C--7/8 full. Papers--O.K.
Test--Satisfactory.

Detector Crayon - Pad--O.K. Crayon--O.K. Test--Satisfactory.

LST - 631

Markings on Kit - 12963--no other marking.

Physical Condition of Kit - Outer appearance O.K.

Chemical Tests

Mustard Test Papers*

Mustard - CK - Vial A, Bottle A and B--O.K. Vial B--
moist and pellets cream colored. Papers
slightly yellow on one end. Test--Sat-
isfactory. Blank--O.K.

Arsenical Test Papers* - Bottle C--contents slightly yellow.
3/4 full. Papers O.K. in appearance.
Test--Satisfactory.

Detector Crayon - Pad--O.K. Crayon--broken. Test--Satis-
factory.

LCT - 818

Markings on Kit - 12890--Red 1 Black 2, 15T EXP.

Physical Condition of Kit - Adhesive off at one end. Clamp and
socket rusted. Slight indentation
from wire.

Chemical Tests

Mustard Test Papers*

Mustard - CK - Vial A, Bottle A and B--O.K. Vial B--
pellets slightly cream colored. Papers
faint yellow at one corner. Test--Sat-
isfactory. Blank--dirty brown. Some
blue on fading.

Arsenical Test Papers* - Bottle C--contents slightly yellow.
2/3 full. Papers O.K. in appearance.
Test--Satisfactory.

Detector Crayon - Pad--O.K. Crayon--O.K. Test--Satisfactory.

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LST - 220

Markings on Kit - 12988--black 15 on box, Markings on Kit 15-6
Red paint on front, upper right hand corner.

Physical Condition of Kit - Kit--O.K. in appearance.

Chemical Tests

Mustard Test Papers*

Mustard - JK - Vial A and B, Bottle A and B--O.K.
Papers--O.K. Test--Satisfactory. Blank--
O.K.

Arsenical Test Papers* - Bottle C--7/8 full. Papers--O.K. in
appearance. Test--Satisfactory.

Detector Crayon - Pad--O.K. Crayon--O.K. Test--Satisfactory.

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*Packets containing these papers showed slight tendency toward un-
sealing, especially the dry mounting tissue--aluminum bond.

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REPORT #12

OINTMENT, PROTECTIVE, M5

ITEM 16

EXPOSED "A" DAY

DATE TESTED: 25-29 July 46

Ship #1-1A* and 6-6A* tested.

The ointment was analyzed as described in "Crossroads" control test 1, Item 16.

All results were in very good agreements with values of control I and II.

ACIDITY HAc

SAMPLE	SHIP #1	SHIP #1A*	SHIP #6	SHIP #6A*	CONTROL II
1	-0.44	-0.43	-0.51	-0.38	-0.38
2	-0.44	-0.42	-0.46	-0.41	-0.43
3	-0.42	-0.42	-0.40	-0.46	-0.42
Average	-0.43	-0.43	-0.44	-0.42	-0.41

AVAILABLE CHLORINE

1	7.48	7.57	7.38	7.51	7.46
2	7.53	7.56	7.51	7.52	7.54
3	7.54	7.51	7.43	7.53	7.48
Average	7.52	7.55	7.44	7.52	7.49

All the values are within the specification limit of 7.25 to 8.25%.

WORK DONE BY:
PFC K.D.BAIR

/s/ JOHN WOTIZ
2nd Lt., CWS

APPROVED:

/s/ JOAQUIN BORSELLINO
Capt., CWS

NOTE: *Exposed unboxed - Others in overseas packages.

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REPORT #13

KIT, POISONED WATER ANALYSIS, TREATMENT CONTROL:

Item #17

EXPOSED "A" DAY

DATE TESTED: September 1946

Analysis

Since we received no information as to storage or exposure of the kits, it is impossible to state whether the effects noted in the accompanying tables are due to blast or to storage. It can be stated that no striking differences were noted among the five kits in regard to the appearance of the contents or the performance of the tests, with the exception of the mustard determination in kit #12890. This was probably due to the deterioration of the DE3 solution, the cause of which cannot be determined from the information given. The damage to all the kits was apparently due to leakage of reagents, especially the HCl. In one kit, #12988, very little HCl had escaped and the interior of this kit was in the best condition of the five. Some scorching of the outside of the kits, #12854 and #12988, was noted but this scorching was slight enough to be disregarded.

Physical Appearance

YOG-83

Identification Marks - Top painted 1, stencil 17-9930700; top, back, rt. hand corner marked with white arc. White lines down rt. end and back starting at end of arc. White 17 on left end.

Outside Kit - Top, back and rt. end slightly scorched.

Inside Kit

Kimpek - Moderately discolored and moist.

Note: HCl bottle had been removed before shipping because of damaged top.

Metal - Parts in l. side corroded. Lid to large compartment off. Dropper holders badly rusted.

Wood - Drawer and bottom compartment division warped. Partitions on left side splitting and disintegrating.

Felt - Lining in top of case disintegrating.

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LCT - 874

Identification Marks - Bottom 17-9930700, 1 5T EXP. LCT 874 - 1.

Outside Kit - O.K., carrying strap broken.

Inside Kit

Kimpak - Moist and disintegrating, color dirty yellow due to corrosive action of cone. HCl on metal parts.

Metal - All parts badly corroded on left side. Dropper holders badly rusted.

Wood - Front edge of top split and warped. Left side splitting and warped causing the two hinges to be loose as well as left handle of shelf.

Felt - Lining in top of case disintegrating.

LCT - 818

Identification Marks - Top white 2, stencil 1 5T EXP 2.

Outside Kit - O.K.

Inside Kit

Kimpak - Damp and yellow, disintegrating.

Metal - All parts badly corroded and hinges rusting. Dropper holders badly rusted.

Wood - Split and disintegrating in left hand side. Top, front edge of case split. Inside wood divisions warped.

Felt - Lining in top of case disintegrating.

LST - 661

Identification Marks - 12963, no other markings.

Outside Kit - O.K.

Inside Kit

Kimpak - Damp and yellow, disintegrating.

Metal - Parts badly corroded, especially left side at back. Lids of both hinged compartments off. Dropper holders badly rusted.

Wood - Split in left hand side of kit.

Felt - Lining in top of case disintegrating

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LST - 220

Identification Marks - Red mark on upper front right hand corner.
Front, black 17-6

Outside Kit - Right end scorched.

Inside Kit

Kimpak - Slight discoloration at left at back.

Metal - Parts on left side very slightly rusted, not impairing
use of kit. Dropper holders slightly rusted.

Wood - O.K.

Felt - O.K.

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REPORT #13A

KIT, POISON WATER TREATMENT AND ANALYSIS:

Item #17

EXPOSED "A" DAY

DATE TESTED: September 1946

Appearance of Apparatus

Alcohol Lamp-Water Bath:

YOG - 83 --- O.K., corroded.
LCT - 874 --- O.K., corroded.
LCT - 818 --- O.K., corroded.
LST - 661 --- O.K., corroded.
LST - 220 --- O.K.

Burette Stand

YOG - 83 --- O.K.
LCT - 874 --- O.K., corroded.
LCT - 818 --- O.K., corroded.
LST - 661 --- O.K., corroded.
LST - 220 --- O.K.

Beaker

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

Color Comparator

YOG - 83 --- Damaged and corroded.
LCT - 874 --- Case peeling from
upper rt. & top
corroded.
LCT - 818 --- Case scorched &
corroded, out of
shape. Contents OK.
LST - 661 --- Hinge and case corroded,
paint peeling on
left bottom, top & end.
Contents O.K.

Bulletin

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

LST - 220 --- O.K. 1 hinge rusted
Contents O.K.

Burettes

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

Droppers 0.5 ml. 1.0 ml.

YOG - 83 --- 0.5 ml. O.K.
1.0 ml. No good,
bubbles in rubber.

Burette Clamp

YOG - 83 --- O.K.
LCT - 874 --- O.K., corroded.
LCT - 818 --- O.K., corroded.
LST - 661 --- O.K., corroded.
LST - 220 --- O.K.

LCT - 874 --- 0.5 ml. O.K.
1.0 ml. No good
rubber soft.

LCT - 818 --- 0.5 ml. O.K.
1.0 ml. No good
rubber soft.

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LST - 661 -- 0.5 ml. O.K.
1.0 ml. No good
rubber soft.
LST - 220 -- 0.5 ml. O.K.
1.0 ml. No good
rubber soft.

Dry Cells

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- O.K.
LST - 661 -- No good (not in
comparator case)
LST - 220 -- O.K.

Filter Paper

YOG - 83 -- Somewhat damaged.
by acid.
LCT - 874 -- Disintegrated.
LCT - 818 -- Disintegrated.
LST - 661 -- Disintegrated.
LST - 220 -- O.K.

Flasks

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

Funnels

YOG - 83 -- O.K.
LCT - 874 -- Small-broken,
large O.K.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

Gas Lighter

YOG - 83 -- O.K.
LCT - 874 -- O.K., rusted.
LCT - 818 -- Slight spark,
corroded.
LST - 661 -- Wouldn't spark
corroded.
LST - 220 -- O.K.

Graduated Cylinder

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

Marking Pencils

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

Matches

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- No good.
LST - 661 -- No good.
LST - 220 -- O.K.

Pipette Case

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- Hole in canvas case.
LST - 661 -- O.K.
LST - 220 -- O.K.

Pipettes

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

Stirring Rod

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

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Test Tube Brushes

YOG - 85 --- O.K.
LCT - 874 --- O.K.
LCT - 818 -- O.K., corroded
LST - 661 --- O.K., corroded
LST - 220 --- O.K., corroded

Test Tube Clamps

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K., corroded.
LST - 661 --- O.K., slightly
 rusted.
LST - 220 --- O.K.

Test Tube Rack

YOG - 83 --- O.K.
LCⁿ - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

Tips for Lighter

YOG - 83 --- O.K.
LCT - 874 --- No good
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

Towel

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- Discolored and
disintegrating.
LST - 661 --- Discolored and
disintegrating.
LST - 220 --- O.K.

Test Tubes

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

Test Tubes. g.g.s.

YOG - 83 - 1 missing
LCT - 874 - O.K.
LCT - 818 - O.K.
LST - 661 - O.K.
LST - 220 - O.K.

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REPORT #13B

KIT, POISON, WATER TREATMENT AND ANALYSIS:

ITEM 17

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical Appearance of Reagents

(1) HCl, conc.

YOG - 83 --- Bottle removed before shipping.
LCT - 874 --- Empty, Top no good.
LCT - 818 --- Empty.
LST - 661 --- Empty, Top loose.
LST - 220 --- Full, top loose.

(2) Acetone, 2 bot.

YOG - 83 --- 1/2 full, full
LCT - 874 --- 7/8 full, 5/6 full.
LCT - 818 --- Full, full
LST - 661 --- Empty, 1/2 full.
LST - 220 --- Full, full.

(3) Distilled water, for Chloramine T

YOG - 83 --- Full.
LCT - 874 --- Empty, top loose.
LCT - 818 --- Full, precipitate.
LST - 661 --- Full.
LST - 220 --- Full.

(4) Distilled water, for Sod. Thiosul.

YOG - 83 --- Full, precipitate, top disintegrating.
LCT-874 --- 2/3 full, precipitate, cap split & disintegrating.
LCT-818 --- Full, precipitate, top slightly blistered.
LST - 661 --- Empty.
LST - 220 --- Full.

(5) Distilled water, for gen. use.

YOG - 83 --- Full, slight precipitate cap corroded.
LCT - 874 --- Full, slight precipitate, cap corroded.

LCT - 818 --- Full, slight precipitate, cap corroded.

(6) Chloroform for dithizone-lactose.

YOG - 83 --- 1/2 full, precipitate.
LCT - 874 --- Empty, band and cap on tightly.

LCT - 818 --- Empty.

LST - 661 --- Full.

LST - 220 --- 1/3 full precipitate.

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(7) Ethyl Alcohol for lamp

YOG - 83 --- 2/3 full, cap tight.
LCT - 874 --- Empty, cap loose.
LCT - 818 --- 1/5 full, precipitate,
top slightly corroded.
LST - 661 --- Empty, top loose.
LST - 220 --- 7/8 full.

(8) Picric Acid

YOG - 83 --- Full.
LCT - 874 --- Full.
LCT - 818 --- Full, top slightly
blistered.
LST - 661 --- Full.
LST - 220 --- Full.

(9) Distilled water for starch

YOG - 83 --- Full.
LCT - 874 --- Full.
LCT - 818 --- Full.
LST - 661 --- Full.
LST - 220 --- Full.

(10) Sodium Carbonate

YOG - 83 --- Full, precipitate,
cap tight.
LCT - 874 --- Full, precipitate,
cap loose.
LCT - 818 --- Full, precipitate.
LST - 661 --- Full, precipitate.
LST - 220 --- Full, precipitate.

(11) L.T. Reagent

YOG - 83 --- Full.
LCT - 874 --- Precipitate, band off.
LCT - 818 --- Full.
LST - 661 --- Full, precipitate.
LST - 220 --- Full, solution dark.

(12) Sulfamic Acid

YOG - 83 --- Full.
LCT - 874 --- Full.
LCT - 818 --- Full.
LST - 661 --- Full.
LST - 220 --- Full.

(13) Potassium Carbonate

YOG - 83 --- Full.
LCT - 874 --- Full, precipi-
tate.
LCT - 818 --- Full, precipi-
tate.
LST - 661 --- Full, precipi-
tate.
LST - 220 --- Full, precipi-
tate, top loose.

(14) Ammonium Persulfate

YOG - 83 --- Full.
LCT - 874 --- Full.
LCT - 818 --- Full.
LST - 661 --- Full.
LST - 220 --- Empty, top
loose.

(15) Ammonium Molybdate

YOG - 83 --- Full.
LCT - 874 --- Full.
LCT - 818 --- Full.
LST - 661 --- Empty, top loose.
LST - 220 --- 1/3 full, top
loose.

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(16) Hydrazine Sulfate

YOG - 83 --- Full
LCT - 874 --- 1/2 full, precipitate
LCT - 818 --- Full
LST - 661 --- Full
LST - 220 --- Full, precipitate.

(17) Nitric Acid

YOG - 83 --- 1/2 full, cap loose & corroded.
LCT - 874 --- Full
LCT - 818 --- 1/4 full, top slightly blistered.
LST - 661 --- Empty, top broken.
LST - 220 --- Full

(18) Potassium Dichromate

YOG - 83 --- Full, cap tight brown precipitate.
LCT - 874 --- 3/4 full, cap tight brown precipitate.
LCT - 818 --- Full, top blistered.
LST - 661 --- Full
LST - 220 --- Full

(19) DB-3

YOG - 83 --- 4/5 Full
LCT - 874 --- 3/4 Full
LCT - 818 --- 1/2 Full, precipitate.
LST - 661 --- Full
LST - 220 --- Full

(20) Ortho-tolidine

YOG - 83 --- 1/2 full
LCT - 874 --- 1/2 full, precipitate.
LCT - 818 --- 3/4 full, precipitate.
LST - 661 --- 3/4 full
LST - 220 --- Full

(21) rH indicator

YOG - 83 --- Full,
green.
LCT - 874 --- Full,
green.
LCT - 818 --- Full,
green.
LST - 661 --- 2/3 full,
top loose,
orange.
LST - 220 --- Full,
blue green

(22) Starch, Potato

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- Top
loose.
LST - 220 --- O.K.

(23) Sodium Thiosulfate

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

(24) Chloramine-T

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K.
LST - 661 --- O.K.
LST - 220 --- O.K.

(25) Potassium Iodide

YOG - 83 --- O.K.
LCT - 874 --- O.K.
LCT - 818 --- O.K. top
sl. blistered
LST - 661 --- O.K.
LST - 220 --- O.K.

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(26)Nitrazine Papers

YOG - 83 -- Yellow
LCT - 874 -- Too yellow
LCT - 818 -- Decolorized
LST - 661 -- Too yellow
LST - 220 -- O.K.

(27)Hydrazine Sulfate

YOG - 83 -- O.K.
LCT - 874 -- O.K., top loose.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

(28)Dithizone

YOG - 83 -- O.K.
LCT - 874 -- O.K.
LCT - 818 -- O.K.
LST - 661 -- O.K.
LST - 220 -- O.K.

WORK DONE BY:
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REPORT #13C

KIT, POISON, WATER TREATMENT AND ANALYSIS:

Item #17

EXPOSED "A" DAY

DATE TESTED: September 1946

Test Performance

Quantitative mustard determination & detection of cyanogen chloride.

YOG - 83 --- Satisfactory
LCT - 874 --- Satisfactory
LCT - 818 --- Unsatisfactory 11
LST - 661 --- Satisfactory
LST - 220 --- Satisfactory

Quantitative Arsenic determination

YOG - 83 --- Unsatisfactory 1
LCT - 874 --- Unsatisfactory 1
LCT - 818 --- Unsatisfactory 1
LST - 661 --- Unsatisfactory 3
LST - 220 --- Unsatisfactory 2

Chlorine Demand determination

YOG - 83 --- Satisfactory 4
LCT - 874 --- Satisfactory 4
LCT - 818 --- Satisfactory 4
LST - 661 --- Satisfactory 5
LST - 220 --- Satisfactory

Cyanide Test

YOG - 83 --- Satisfactory
LCT - 874 --- Satisfactory
LCT - 818 --- Satisfactory
LST - 661 --- Satisfactory
LST - 220 --- Satisfactory

Test for Lead and Thallium

YOG - 83 --- Unsatisfactory 6,7,8
LCT - 874 --- Unsatisfactory 6,7,8
LCT - 818 --- Unsatisfactory 6,7,8
LST - 661 --- Unsatisfactory 6,8
LST - 220 --- Unsatisfactory 6,7,8

Test for Mercury

YOG - 83 --- Questionable 6,7
LCT - 874 --- Satisfactory,
faint 6,7
LCT - 818 --- Questionable 6,7
LST - 661 --- Unsatisfactory 6
LST - 220 --- Questionable 6,7

Test for Selenium

YOG - 83 --- Satisfactory
LCT - 874 --- Satisfactory
LCT - 818 --- Satisfactory
LST - 661 --- Satisfactory
LST - 220 --- Satisfactory

pH Determinations

Nitrazine papers

YOG - 83 --- Satisfactory
LCT - 874 --- Satisfactory
LCT - 818 --- Satisfactory
LST - 661 --- Unsatisfactory
LST - 220 --- Satisfactory

pH Indicator

YOG - 83 --- Satisfactory 9
LCT - 874 --- Satisfactory 9
LCT - 818 --- Satisfactory 9
LST - 661 --- Unsatisfactory 10
LST - 220 --- Satisfactory

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NOTES:

1. Ammonium persulfate solution decomposed; ammonium molybdate and hydrazine sulfate solutions worked satisfactory when laboratory preparation of ammonium persulfate used.
2. Ammonium persulfate bottle empty, other reagents all right.
3. Molybdate bottle empty, ammonium persulfate solution decomposed, hydrazine sulfate solution satisfactory.
4. Sodium thiosulfate solution quite cloudy due to contamination of the water in bottle 4 by the liners of the screw caps. Laboratory HCl used.
5. Distilled water from laboratory used, solution only slightly cloudy, laboratory HCl used.
6. Dithizone solution very faint blue-green or colorless when prepared.
7. Laboratory chloroform used to make 100 ml. of solution.
8. Distilled water blanks gave same results as lead test solution due to decomposition of dithizone reagent.
9. pH solutions green instead of blue-green, test gave pH ca 5.0-5.5 rather than 6.0-6.5 with distilled water.
10. pH solution bright orange, reading for distilled water 4.0 instead of 6.0-6.5
11. Test color about 2/3 as intense as tests of other kits for mustard; color peach instead of yellow for cyanogen chloride.

WORK DONE BY:
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REPORT #14

KIT, TREATMENT, GAS CASUALTY:

Item 18

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and chemical description of Kit, Treatment, Gas Casualty:

1. Item number: 18. Name: Kit, Treatment, Gas Casualty, No. 9776700.
2. Ship: LST 661.
3. Condition in transit: Tank deck of LST, well protected from weather.
4. Weather conditions during total period of exposure: Mostly clear with occasional squalls, high humidity, average temperature, 83° F.
5. Description of placement: Strapped on top of ready-boxes on aft gun turrets.
 - a. Orientation of item to burst: perpendicular to broadside.
 - b. Distance from burst: 2500 yds.
 - c. Distance above water level: 35 ft.
6. Date of test and time: 0900 1 July, 1946.
7. Date examined: 2 July 1946.

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents.

1. Two cartons of Petrolatum moistened by seepage.
2. Six cartons of BAL Ointment moistened by seepage, contents assayed. Markings on some tubes illegible. One tube found to be broken. No chemical decomposition in Bal tubes.

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3. Extreme seepage of M4 ointment tubes; tubes partially decomposed. No active chlorine.
4. One bottle formerly containing Chloroform now empty, one bottle half full, labels legible, seals on bottle caps intact.
5. Copper Sulfate Solution: container 3/4 full, label legible, forceps slightly rusted.
6. Four bottles of Eye and Nose Drops: cartons moist, labeling legible, bottles containing solution 3/4 full.
7. Ophthalmic Disc: paint on metal container blistered and peeling, labeling illegible, one tube of Fluorescein broken.
8. Amyl Salicylate: one can practically empty: seal intact.
9. Ivory Soap: one bar (next to Amyl Salicylate) broken and partially discolored.

Comment:

Damage to Kit due to the destruction of M4 and BAL Ointments.
Some loss of solvents due to heat.

WORK DONE BY:
MEDICAL DIVISION
CHEMICAL WARFARE CENTER
EDGEWOOD ARSENAL, MD.

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REPORT #14A

KIT, TREATMENT, GAS CASUALTY:

ITEM 18

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and chemical description of Kit, Treatment, Gas Casualty:

1. Item number: 18. Name: Kit, Treatment, Gas Casualty.
2. Ship: LST 220: Ship position: 3200 yds. N of Nevada.
Ship orientation: ESE to WNW B 54.
3. Description of packaging: single, case, without packaging.
4. Description of placement: horizontal. Inspected by B. F. Smith, 16 June, 29 June.
 - a. Position: 8 ft. from starboard rail, Frame 31.
 - b. Method of securing: strapped to cover, 3' above deck.
 - c. Exposure to target: full.
5. Inspection after exposure: by B. F. Smith, 2 July, 1600.
 - a. Exposure to blast: full.
 - b. Condition of package: perfect.
 - c. Remarks: no evidence of heat or blast. See #14.

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents.

1. One bottle formerly containing Chloroform: now empty.
2. Six cartons of BAL moistened by seepage from tubes. No Chemical decomposition.

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Comment:

Contents of container intact, with the exception of the Chloroform.
No apparent damage due to heat.

WORK DONE BY:
MEDICAL DIVISION,
CHEMICAL WARFARE CENTER
EDGEWOOD ARSENAL, MD.

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REPORT #14B

KIT, TREATMENT, GAS CASUALTY:

ITEM 18

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and chemical description of Kit, Treatment, Gas Casualty:

1. Item number: 18. Name: Kit, Treatment, Gas Casualty.
2. Ship: YOG 83. Ship position: berth 143. 1000 yds. from Nevada. Ship orientation: 040 true bearing.
3. Description of packaging: Case, wood, excellent condition.
4. Description of placement: Catwalk. 18 June A-1 30 June, 1946.
 - a. Position: 17' above water, 10' foreward of gas shells, right side up.
 - b. Method of securing: Steel strapping secure to catwalk.
 - c. Exposure toward target: no shielding.
 - d. Remarks: 5/8" metal bands (12) for straps. Item on port side of catwalk.
5. Inspection after exposure: H plus 2, 3 July 1946.
 - a. Exposure to blast: Complete exposure except for strapping.
 - b. Condition of package: Exposed unpacked, unmoved.
 - c. Condition of itmes: Paint scorched and exposed sides, marking.
 - d. Remarks: 80% defaced.
6. Additional detailed information: Contents in excellent condition. Inspected prior to packing for shipment on 4 July 1946.

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents:

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1. Chloroform: bottle empty; seal not affected.
2. Copper Sulfate: forceps rusted.
3. Petrolatum: slight oozing of Petrolatum from tubes; paint slightly affected.
4. BAL tubes: end of tubes corroded; some contamination of carton.
5. Calamine concentration tube: unable to extrude material from tube.

Comment:

Contents of Kit in good condition except for Chloroform and BAL tubes. Some evidence of heat on top of Amyl Salicylate cans.

WORK DONE BY:
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CHEMICAL WARFARE CENTER
EDGEWOOD ARSENAL, MD.

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REPORT #14C

KIT, TREATMENT, GAS CASUALTY:

ITEM 18

EXPOSED "A" DAY

DATE TESTED: September 1946

Physical and chemical description of Kit, Treatment, Gas Casualty:

1. Item number: 18. Name: Kit, Treatment, Gas Casualty.
2. Ship: LCT 818. Ship position: berth 164. Ship orientation: bow 75° east.
3. Description of packaging: 1 ea. kit, 22 x 14.5 x 8.
4. Description of placement: Inspected by Wotiz, June 7, 1946.
 - a. Position: Starboard forecastle, St'bd side, 1' aft of 10" chock.
 - b. Method of securing: strapped.
 - c. Exposure toward target: 100%
5. Inspection after exposure: by Wotiz, July 4, 1946.
 - a. Exposure to blast: all O.K. except 5" in center shielded by bitt.
 - b. Condition of package: slightly scorched.

- - - - -

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents:

1. Two bottles of Chloroform empty; cartons moistened.
2. BAL cartons moistened.

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Comment:

Contents in good condition, with the exception of the chloroform.
Loss evidently due to heat.

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REPORT #14D

KIT, TREATMENT, GAS CASUALTY:

ITEM 18

EXPOSED "A" DAY
DATE TESTED: September 1946

Physical and chemical description of Kit, Treatment, Gas Casualty:

1. Item number: 18. Lot number 9776700.
2. Ship: LCT 871-1.
3. Number on kit: 12947.

Package returned to Medical Division, Edgewood Arsenal, Md., for inspection of contents:

1. BAL Ointment: Six (6) cartons containing BAL Ointment moistened by seepage; labeling legible. No chemical decomposition.
2. Chloroform: One (1) carton moistened, labeling legible, bottle empty.
3. Copper Sulfate: Carton moistened, labeling legible, bottle 3/4 full.

Comment:

Loss of Copper Sulfate and Chloroform probably due to heat.

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REPORT #15

KIT, WATER TESTING, SCREENING:

ITEM 19

EXPOSED "A" DAY

DATE TESTED: September 1946

Analysis

Despite a few cases where some deterioration of the contents of the vials is suspected, all the tests in all the kits were satisfactory.

KIT, WATER TESTING, SCREENING

YOG - 83

Markings on Kit - 12854- White dot on top-center front; right end-back and centered.

Physical Condition of Kit - Back end, right end somewhat pitted. Bubbles in plastic. Case top somewhat warped in back. Deep indentation from wire.

Chemical Tests

Arsenic Test - Vial A-paper brown, pellets discolored in back. Vial B-O.K. Vial C-paper discolored (red). Zinc-yellow. Test--Unsatisfactory. Stain too short by 1/8".

Mustard Test -

Mustard - OK - Vial D-O.K. Vial E-few black spots on interlining paper. Test--satisfactory.

Chlorine Demand Test - Paper lining - O.K. Test--satisfactory.

pH Test - Papers - O.K. Test--satisfactory.

LCT - 874

Markings on Kit - 12947 - No marking on kit.

Physical Condition of Kit - Kit - O.K.

Chemical Tests

Arsenic Test - Paper lining - O.K. Test--satisfactory.

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Mustard Test

Mustard - CK - Vials D and E - O.k. Test--satisfactory.

Chlorine Demand Test - Paper lining - O.K. Test--satisfactory.

pH Test - Papers - O. K. Test--satisfactory.

LST - 661

Markings on Kit - 12962 - 15T EXP. Front w in white on top, white dot on front.

Physical Condition of Kit - Adhesive burned off in front. Case slightly warmed in front.

Chemical Tests

Arsenic Test - Vial A--had moist spots on paper where pellets were in contact. Vial-B & C - O.K. Test--satisfactory.

Mustard Test

Mustard - CK - Vials D and E--O. K. Test--satisfactory

Chlorine Demand Test - Paper lining discolored in several spots. Test--satisfactory.

pH Test - Papers - O.K. Test--satisfactory.

LCT - 818

Markings on Kit - 12890 - yellow 3 on top and on front at upper left hand corner. Kit - O.K.

Physical Condition of Kit - Kit - O.K.

Chemical Tests

Arsenic Test - Vials - O.K. Test--satisfactory

Mustard Test

Mustard - CK - Vials D and E - O.K. Test--satisfactory

Chlorine Demand Test - Paper lining - O.K.

pH Test - Papers - O.K. Test--satisfactory.

LST - 220

Markings on Kit - 12988 - 19-6 in black on plastic envelope. Red dot on left end, upper front corner.

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Physical Condition of Kit - Kit - O.K.

Chemical Tests

Arsenic Test - Vials - O.K. Test--satisfactory.

Mustard Test

Mustard - CK - Vials D and E - O.K. Test--satisfactory.

Chlorine Demand Test - Paper lining - O.K. Test--satisfactory.

pH Test - Papers - O.K. Test--satisfactory.

WORK DONE BY:
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REPORT #16

MASK, GAS, HEADWOUND

ITEM 20

EXPOSED "A" DAY
DATE TESTED: 2 August 46

1. Description of sample:

I. Ship 1, exposed in case. Cannister Number M11 FT 13-5-3
D 45 HD 3Z6PZ 16Z 235 gr. Mask in good condition.

II. Ship 1, exposed individually. Cannister Number M11
FT 13-5-3 C43 HD 3Z6PZ 63 31 230 gr. Carrier melted and stuck to mask,
about 50% remaining. Fibre buckle scorched. Cannister in good condi-
tion. Mask stuck together where case melted on outside. Left middle
strap scorched. Three holes in mask; eyepieces unaffected.

III. Ship 4. Exposed in case. Cannister No. M11 FT 13-5-3
D45 HD 3Z6PZ 16Z 227.5 gr. Mask in good condition.

IV. Ship 4. Exposed individually. Cannister Number M11
FT 13-5-3, C45 HD 3Z6PZ 28 30 232.5 gr. Carrier stained and weather
beaten. Small holes melted through in blue lettering. Cannister in
good condition. Mask somewhat tacky.

V. Ship 6. Exposed in case. Cannister Number M11 FT 13-5-3
C45 HD 3Z6PZ 28 31, 232.5 gr. Mask in good condition.

VI. Ship 6. Exposed individually. Cannister Number M11
FT 13-5-3 C45 HD 3Z6PZ 46 31 232.5 gr. Stains on mask.

VII. Control sample. Retained at Schofield Barracks during test.
Cannister No. M11 FT 13-5-3 C45 HD 3Z6PZ 46 31 232.5 gr. Mask in good
condition, somewhat tacky.

2. The masks were tested for leakage by putting it on, closing the
valves and attempting to breathe. The cannister was tested for resistance
and smoke penetration according to procedure outlined in CWS pamphlet No.
2, dated 1 Dec 43. The resistance to CG was tested according to procedure
outlined in CWS Field Lab Memo 3-1-8 dated 19 Nov 43. The strength of the
mask material was tested on a Scott Tensile Strength Apparatus according
to ASTM Spec. D39-39 with the following spec's. A one inch strip of
material was used and the distance between the jaws was reduced to one
inch.

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3. Test Results:

SAMPLE	I	II	III	IV	V	VI	VII
LEAKAGE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
CANNISTER RES. mm water	85	82	79	82	85	84	87
DOP PENETRATION %	.09	.07	.11	.09	.10	.07	.10
CG PENETRATION Min.	43	35	38	41	42	36	39
TENSILE STR. Lbs	-	26	-	20	-	24	24
ELONGATION, INCHES	-	5	-	4.7	-	5.0	5.2

4. Disposition of samples: Destroyed.

/s/ JESSE M BROOKE
2nd Lt., CWS

APPROVED

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #17

MASK, GAS SERVICE, M3-10A1-6

ITEM 21

EXPOSED "A" DAY

DATE TESTED: 2 August 46

1. Description of samples:

I. Ship #1. Sample exposed in package. Cannister #M10A1
9-4-8 SO 1 H 325 517.5 grams. Mask is in good condition.

II. Ship #1. Sample exposed individually. Cannister #M10A1
Lot JJ 12-4-2 BD 3V5, 3-44, 822, 563 grams. Heavily scorched. Surface
of mask scratched. Cannister intake valve warped. Does not work.

III. Ship #4. Sample exposed in package. Cannister #M10A1,
8-4-2 SO HH 325, 532.5 grams. Mask is in good condition.

IV. Ship #4. Sample exposed individually. Cannister #M10A1
Lot JJ-12-4-2, 81-19 BD 3V53-44, 560 grams. Carrier slightly scorched.
Cannister dented.

V. Ship #6. Sample exposed in package. Cannister #M10A1,
8-4-2 SO HH 325, 522 grams. Mask is in good condition.

VI. Ship #6. Sample exposed individually. Cannister #M10A1,
Lot JJ-12-4-2, 822 BD 3V53-44, 566 grams. Mask in good condition.

2. The masks were tested for leakage by putting them on, closing the
valves and attempting to breathe. The cannisters were tested for resist-
ance and smoke penetration according to CWS Pamphlet #2 dated 1 Dec 43.
The resistance to CG was tested according to CWS Field Lab Memo 3-1-8
dated 19 Nov 43.

3. Results of test:

Sample	I	II	III	IV	V	VI
Cannister resistance mm water	70	74	71	71	67	75
DOP Penetration, %	.10	.10	.10	.07	.10	.06
CG Penetration, minutes	53	57	56	56	53	55
Leakage	none	none	none	none	none	none

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4. Disposition of sample: Cannisters destroyed. Remainder of mask retained at Schofield Barracks.

/s/ JESSE M BROOKS
2nd Lt., CWS

APPROVED

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #18

MASK, GAS SERVICE, MIT 19R52, M11-MIT, E10R19

ITEM 22

EXPOSED "A" DAY

DATE TESTED: 2 August 46

1. Description of sample:

I. Ship #1. Mask exposed in package. Cannister #M11 FT 28-5-2 HD 3Z6PZ 190, 5 247.5 grams. Mask in good condition.

II. Ship #1. Mask exposed individually. Cannister #M11 FT 28-5-2 HD 3Z6PZ 190-14, 247.5 grams. Carrier weathered.

III. Ship #4. Mask exposed in package. Cannister #M11 FT 28-5-2 HD 3Z6PZ 190 5, 247.5 grams. Mask is in good condition.

IV. Ship #4. Mask exposed individually. Cannister #M11 FT 28-5-2 HD 3Z6PZ 190 36, 245 grams. Carrier shows heat damage. Rubber soft. Mask in good condition.

V. Ship #6. Mask exposed in package. Cannister #M11 FT 28-5-2 HD 3Z6PZ 190 39, 247.5 grams. Metal part of intake valve bent.

VI. Ship #6. Mask exposed individually. Cannister #M11 BS 543 8-17 FTS 223 196C 3R6PZ 252.5 grams. Mask in good condition.

2. The masks were tested for leakage by putting them on and closing the valves and attempting to breathe. The cannisters were tested for resistance in smoke and penetration according to CWS Pamphlet #2 dated 1 Dec 43. The resistance to CG was tested according to CWS Field Lab Memo 3-1-8 dated 19 Nov 43.

3. Results of test:

Sample	I	II	III	IV	V	VI
Leakage	none	none	none	none	none	none
Cannister resistance, mm water	76	71	79	78	77	83
DOP Penetration %	.07	.10	.03	.05	.15	.06
CG Penetration, minutes	38	34	39	38	40	43

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4. Disposition of sample: Cannisters were destroyed. Rest of masks retained at Schofield Barracks.

/s/ JESSE M BROOKE
2nd Lt., CWS

APPROVED:

/s/ JOAQUIN BORSELLINO
Capt., CWS

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REPORT #19

NAPALM

ITEM 30

EXPOSED "A" DAY

DATE TESTED: 29 July 46

1. Description of sample:

I. Ship #1. Lot No. 21338. Can burst open and resealed.
(Can was crushed when strapped on to catwalk of ship.) Exterior of
can scorched.

II. Ship #4. Lot No. 21351. Can crushed and badly weathered.

III. Ship #5. Lot No. 21333. Can shows signs of weathering.

IV. Control. Lot No. 21871. Sample retained at Schofield
Barracks during the test.

2. Consistency tests were made on 8% Napalm in QM issue gasoline
according to CWS Directive 201 A. Moisture tests were run according
to CWS specification 196-131-107A. Iodine numbers were run according to
procedure outlined in Scotts Standard Methods of Chemical Analysis
pp 1768-1769. Free acids were run according to procedure outlined in
OSRD Report No. 2036, 17 Nov 43.

3. Results of test:

SAMPLE	I	II	III	IV
Consistency at 48 hours	235	95	665	790
Iodine Number	24.7	24.3	25.0	23.3
Moisture	0.81	2.31	0.56	0.43
Free acid	8.9	8.6	9.0	9.3

4. Disposition of sample: Destroyed.

/s/ JESSE M BROOKE
2nd Lt., CWS

APPROVED:

/s/ JOAQUIN BORSSELLINO
Capt., CWS

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REPORT #20

PAINT LIQUID, VESICANT DETECTOR, M5

ITEM 23

EXPIRATION DAY

DATE: 19 & 29 July 46

1. Sensitivity of the detector paint exposed on Ships 1, 2, 4, 5, and 6 was determined as described in "Crossroads Control Test 1. Item 23."
2. The sensitivity after 24 hours and one week were within the written specification limits of 5 seconds and 30 minutes.

WORK DONE BY:

**F. J. POWER
G. E. SIMMONS**

**/s/ JOHN WOTIZ
2nd Lt., CWS**

APPROVED BY:

**/s/ JOAQUIN BORSSELLINO
Capt., CWS**

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REPORT #20A

PAINT, LIQUID, VESSICANT DETECTOR, M5

ITEM 23

EXPOSED: CONTROL
DATE TESTED: 25 July 1946

Control Test 1, Supplement 1

1. The detector paint applied on April 10, was tested for sensitivity after one month.
2. The results were within the specification limits of 5 seconds and 30 minutes.

Work done by:
Pfc. W. V. Brzoska

Approval Recommended

/s/ John H. Wotiz
2nd Lt., CWS

Approved:

/s/ Joaquin Borsellino
Capt., CWS

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REPORT #21

POT, SMOKE, FLOATING, M4A2

ITEM 24

EXPOSED "A" DAY
DATE TESTED 25 July 46

Ship #1

GWS item #24, Pot, Smoke, Floating, M4A2, Lot M-14-44, 210A4Z.
Fuze failed. Ignited by flame thrower igniter. Burning time-9 minutes;
color of smoke-greyish white as per standard. Normal functioning aside
from fuze.

Ship #6

Lot 210A-2032. Fuze failed. Ignited by flame thrower igniter.
Burning time-12 minutes; color of smoke-greyish white as per standard.
Normal functioning aside from failure of fuze.

NOTE: Both pots in excellent condition on the inside. Outside paint of
number 1 was slightly colored by heat of blast.

/s/ B. F. SMITH

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REPORT #22

RH 195

ITEM 25

EXPOSED "A" DAY

DATE TESTED: 25-29 July 46

The agent was analyzed as described in "Crossroads" test 1, Item 25.

The values for moisture and insolubles in chloroform were within the specification limits of not more than 0.03% and 5% by weight respectively.

MOISTURE

SAMPLE	SHIP #1	SHIP #6
1	0.015	0.033
2	0.020	0.037
3	0.025	0.057
Average	0.020	0.036

INSOLUBLE IN CHLOROFORM

SAMPLE	SHIP #1	SHIP #6
1	1.44	2.34
2	1.56	2.32
3	1.53	2.16
Average	1.51	2.27

The values for active chlorine were lower than the minimum requirements of 35%. A control sample was therefore analyzed.

ACTIVE CHLORINE

SAMPLE	SHIP #1	SHIP #6	CONTROL II
1	34.63	34.52	35.35
2	34.93	34.62	35.39
3	34.73	34.65	35.33
Average	34.78	34.60	35.35

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**WORK DONE BY:
PFC K. D. BAIR
PFC R. K. GAILEY**

**/s/ JOHN WOTIZ
2nd Lt., CWS**

APPROVED:

**/s/ JOAQUIN BORSELLINO
Capt., CWS**

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REPORT #23

SHELL, WP, 4.2-in CM, LOT 142-79 and 142-100, &
SHELL, FS, 4.2-in CM, LOT 3931-1

ITEMS 26 & 27

EXPOSED "A" DAY
DATE TESTED: 9 Aug 46

1. Eight shells, WP, 4.2-in CM, and eight shells, FS, 4.2-in CM, which had been exposed to the "A" blast in the regulation packing (although the FS shells were not in the cylindrical cardboard containers) were tested for range, time of flight, characteristics of flight, size of burst, etc., along with six unexposed WP shells of the same lot, by firing them from a single mortar, equipped with lanyard, which had been firmly emplaced by firing six HE shells at a considerable range.

2. The exposed and control shells were fired at a constant elevation of 1015 μ and charge of 9 1/2 Rings, with a maximum error in range for the test shells of 80 yds for the WP and 40 yds for FS, and deflection of 2 μ , as determined by Aiming Circles laterally displaced from the gun position. The gunnery, conducted by a squad of the 91st Cml Mortar Co, was excellent. All test and control shells were fired by lanyard. From the table of Firing and Results which follows, it will be seen that the WP averaged 100 yds greater range than the FS:

WP CONTROLS - Lot 142-79

SHOT	TF (sec)	Range (yds)
1	19	1360
2	20	1410
3	20	1400
4	20 1/2	1390
5	20	1200
6	19 1/2	1200
Average	20	1310

FS				WP			
SHOT	SHIP	TF(sec)	RANGE(yds)	SHOT	SHIP	TF(sec)	RANGE(yds)
1	1	21	In defilade	1	1	22	1310
2	1	22	1250	2	1	20	1390
3	2	19	1230	3	2	20	1310
4	2	21	1220	4	2	20 1/2	1310
5	5	21	1220	5	5	19	1390

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SHOT	SHIP	TF(sec)	RANGE(yds)	SHOT	SHIP	TF(sec)	RANGE(yds)
6	5	19	1250	6	5	20	1310
7	6	17 1/2	1210	7	6	20 1/2	1310
8	6	20	1210	8	6	20	1310
Average		20	1230	Average		20	1330

/s/ CHRIS L MENGIS
2nd Lt., CWS

APPROVED:

/s/ B F SMITH

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REPORT #24

SHELL, 105mm, CG, M60

ITEM 35

EXPOSED "A" DAY

DATE TESTED: 30 July to 2 Aug

1. The shells were tapped and analyzed as described in "Crossroads" Control Test I, Item 35. All results were within specification limits. Lot number of shells: EA 99 3-46.

% Phosgene

Sample	Team 1	Team 4	Control Test II
1	98.2	98.4	98.4
2	98.3	98.4	98.5
3	98.3	-----	-----
Average	98.3	98.4	98.4

Acidity as HCl

Sample	Team 1	Team 4	Control Test II
1	0.43	0.43	0.45
2	0.44	0.42	0.45
Average	0.43	0.43	0.45

Free Chlorine

Sample	Team 1	Team 4	Control Test II
1	0.045	0.046	0.029
2	0.040	0.046	0.027
Average	0.043	0.045	0.028

WORK DONE BY:
PFC F A WALTERS
PFC R GAILLEY

/s/ JOHN WOTIZ
2d Lt., CWS

APPROVED:

/s/ CHRIS L MENGIS
2d Lt., CWS

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REPORT #24A

SHELL, 105mm, M60, "CK"

ITEM 36

EXPOSED "A" DAY

DATE TESTED: 30 Jul to 2 Aug

1. The shells were tapped and analyzed as described in "Crossroads Control Test I, Item 36." The results for %CK and % Acidity were below the minimum specification amount of 96% and 0.024% respectively. They were, however, in agreement with the values of Control Test I and Control Test II. Lot number of shells: EA 99 3-46.

% "CK"

Sample	Team 1	Team 4	Control Test II
1	94.3	94.5	94.2
2	94.6	94.2	94.5
3	94.4	94.3	94.6
Average	94.4	94.3	94.4

% Acidity as HCl

Sample	Team 1	Team 4	Control Test II
1	0.13	0.079	0.063
2	0.13	0.079	0.061
3	0.15	0.075	0.060
Average	0.14	0.078	0.061

No free chlorine was detected in any exposed or control sample.

WORK DONE BY:
PFC K D BAIR
PFC F A WALTERS
PFC R GALLEY

/s/ JOHN WOTIZ
2d Lt., CWS

APPROVED:

/s/ CHRIS L MENGIS
2d Lt., CWS

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APPENDIX F

STATISTICAL REPORT OF THE CHEMICAL WARFARE UNIT

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APPENDIX F

STATISTICAL REPORT OF THE CHEMICAL WARFARE UNIT

Personnel:

6 Officers
1 Civilian
17 Enlisted Men
24 Total

Miles traveled:

Rail: 72,000 miles
Ship: 150,000 miles
Plane: 49,000 miles
Total: 271,000 miles

Value of Test Items: \$5,000.00

Cost of CW Participation: \$26,720.00

Weight of Test Items: 168,000 lbs.

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